SHOW FILES;DS
File 9:Business & Industry(R) Jul/1994-2005/May 12
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File 180:Federal Register 1985-2005/May 13
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File 649:Gale Group Newswire ASAP(TM) 2005/May 05
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File 781:ProQuest Newsstand 1998-2005/May 13
(c) 2005 ProQuest Info&Learning

Set	Items	Description
S1	26	(VOLUME (2W) (PRICE OR PRICING)) AND (AGGREGAT? (N3) ORD ?) AND PD<=010806
S2	19	RD (unique items)
S3	0	S2 AND REMOTE?

?

T S2/3,KWIC/1-19

2/3,KWIC/1 (Item 1 from file: 9)
DIALOG(R)File 9:Business & Industry(R)

02472396 Supplier Number: 24869640 (USE FORMAT 7 OR 9 FOR FULLTEXT)
MobShop Launches New Rev of Selling App
(Group buying technology provider MobShop introduces MobShop Seller 4.0)
Online Reporter, p N/A
May 28, 2001
DOCUMENT TYPE: Newsletter (United States)
LANGUAGE: English RECORD TYPE: Fulltext
WORD COUNT: 183

(USE FORMAT 7 OR 9 FOR FULLTEXT)

TEXT:
...which prices fall or value increases as more buyers join in. It automatically coordinates and aggregates orders from multiple buyers into high-volume, collaborative transactions, allowing buyers to take advantage of a...
...contracts or immediate spot market buys so buyers can aggregate demand based on pre-negotiated volume / price tiers. MobShop Seller now also has integrated communication tools that facilitate purchasing group formation and...

2/3,KWIC/2 (Item 1 from file: 75)
DIALOG(R)File 75:TGG Management Contents(R)

00217969 SUPPLIER NUMBER: 21276652 (USE FORMAT 7 FOR FULL TEXT
Stock returns in thinly traded markets.
Butler, Kirt C.; Osborne, Richard M.
The Financial Review, v33, n3, p21(14)
August, 1998
ISSN: 0732-8516 LANGUAGE: English RECORD TYPE: Fulltext; Abstract
WORD COUNT: 5155 LINE COUNT: 00420

... p-values to the expected number provides an alternative to the variance ratio test. In order to aggregate p-values across firms, our results report statistical significance for each sample based on a... sub.N(t)).

WORD COUNT: 5877 LINE COUNT: 00568

... auction orders are also submitted by noise traders. Let [[Delta]u.sub.n] be the aggregate order submitted by noise ...this discussion.

REFERENCES

Admati, Anat R. and Paul Pfleiderer, 1988, A theory of intraday patterns: Volume and price variability, Review of Financial Studies, 1, 3-40.

Back, Kerry, 1990. Continuous insider trading and...

...Fuqua School of Business, Duke University.

-- 1991, Public information and competition: Their effects on trading volume and price volatility, Working paper, Duke University.

Holden, Craig W., 1990, Intertemporal arbitrage trading: Theory and empirical...

19920300

2/3,KWIC/7 (Item 1 from file: 148)
DIALOG(R)File 148:Gale Group Trade & Industry DB

13399882 SUPPLIER NUMBER: 71768721 (USE FORMAT 7 OR 9 FOR FULL
Transaction Costs.(Statistical Data Included)
Berkowitz, Stephen A.; Logue, Dennis B.
Journal of Portfolio Management, 27, 2, 65
Wntr, 2001
DOCUMENT TYPE: Statistical Data Included ISSN: 0095-4918
LANGUAGE: English RECORD TYPE: Fulltext
WORD COUNT: 6310 LINE COUNT: 00589

... from a sell-side broker, the firm's trader can choose among such alternatives as aggregating the order with other orders or, perhaps, crossing the order internally with opposing orders received from other... time frame surrounding a trade to be measured), and price measures (e.g., closing price, volume -weighted average price during the day) fails to capture the dynamic interactions among market participants. This is not... appear in Panel A: the mean of the high and low, the close, and the volume -weighted average price (VWAP) for the security during the day of the trade.

USING THE CHAIN OF DISCRETION...

...next day, thereby exposing the order to an opportunity set of prices summarized as the volume -weighted average price of $87.2514.

The cost of exercising this discretion is calculated as the difference between the volume -weighted average price of the opportunity set of trades and the volume -weighted average price of the trades that were actually executed. The cost of discretion in this case is...of discretion.

For the firm's trading desk, the outcome price is $87.2632 (the volume -weighted average price of the five trades used to fill the 19,000 shares that were bought before...

...cost of the trades used to fill the order). The opportunity set VWAP is the volume -weighted average price of trades during the time the broker has the order. For all market participants, the...

...the contractual provisions of ECNs as they vie for institutional business.

We recommend using the volume -weighted average price for institutional-sized fills across the markets where the security trades. This makes use of...

20010101

2/3,KWIC/8 (Item 2 from file: 148)
DIALOG(R)File 148:Gale Group Trade & Industry DB

12861094 SUPPLIER NUMBER: 67579016 (USE FORMAT 7 OR 9 FOR FULL
Mobshop, Inc. and Frictionless Commerce Partner to Offer Advanced B2B Solutions Within Exchanges.
PR Newswire, NA
Dec 5, 2000
LANGUAGE: English RECORD TYPE: Fulltext
WORD COUNT: 588 LINE COUNT: 00058

... www.newscom.com/cgi-bin/prnh/20001107/SFTU055LOGO)

The jointly implemented technology will combine the order aggregation and volume -based dynamic pricing features of MobShop's DemandSuite Exchange(TM) 3.0 application set with the decision support...

20001205

2/3,KWIC/9 (Item 3 from file: 148)
DIALOG(R)File 148:Gale Group Trade & Industry DB

12186943 SUPPLIER NUMBER: 62446112 (USE FORMAT 7 OR 9 FOR FULL
Meridex introduces advanced features to its B2B Network.
PR Newswire, NA
May 25, 2000
LANGUAGE: English RECORD TYPE: Fulltext
WORD COUNT: 561 LINE COUNT: 00051

... allows buyers on the network to join group buyers online to take advantage of aggregate volume pricing . Buyers join the Buying Groups based on category and place orders individually through the category and the system automatically aggregates the purchase orders with other buyers while searching and matching collaborative orders against wholesale pricing available from the...

20000525

2/3,KWIC/10 (Item 4 from file: 148)
DIALOG(R)File 148:Gale Group Trade & Industry DB

11633305 SUPPLIER NUMBER: 58429780 (USE FORMAT 7 OR 9 FOR FULL
Ashton Technology Group, Inc. Announces Nasdaq National Market System Listing; Enters into Clearing Arrangements With 8 National Brokerage Firms.
Business Wire, 1297
Jan 3, 2000
LANGUAGE: English RECORD TYPE: Fulltext
WORD COUNT: 464 LINE COUNT: 00045

... clear and settle trades by institutions, pension funds, and money managers utilizing Ashton's Electronic Volume Weighted Average Price (eVWAP(TM)) trading system directly or through Croix Securities, a broker-dealer subsidiary of Ashton...

...firm integration, we can provide the connectivity to the larger institutions and brokers-dealers, who aggregate orders from multiple locations, to build the system's volume growth and liquidity."
Ashton Technology Group...

20000103

2/3,KWIC/11 (Item 1 from file: 180)
DIALOG(R)File 180:Federal Register

DIALOG Accession Number: 02242296 Supplier Number: 920702258
U.S. Equity Market Structure Study
Volume: 57 Issue: 141 Page: 32587
CITATION NUMBER: 57 FR 32587
Date: WEDNESDAY, JULY 22, 1992

TEXT:
...or designated broker-dealers.
Proprietary systems also provide procedures for executing or settling transactions at volume and price levels agreed to by those participants./42/ The systems operate according to various configurations, such... order is influenced by the payment of compensation by particular markets or market makers. The aggregation of customer orders to fulfill an agreement to route orders based on payment effectively prevents the broker from... of what is sometimes reported as fourth market volume is in fact Instinet and Jefferies volume .

E. Price Discovery versus Passive Trading

Another concept that is important to understand in any discussion of...m. to 4 p.m. trading session.
Concomitantly, the regional exchanges also have experienced low volume in their price protection sessions. In particular, during the same five days, daily volume on the BSE, MSE...
19920722

2/3,KWIC/12 (Item 2 from file: 180)
DIALOG(R)File 180:Federal Register

DIALOG Accession Number: 02118162 Supplier Number: 880502060
Self-Regulatory Organizations; National Association of Securities Dealers, Inc.; Proposed Amended Rule Change Relating to Amendments to the Rules (Practice and Procedures for the Small Order Execution System and Part VI, Schedule D to the NASD By-Laws

Volume: 53 Issue: 100 Page: 18643
CITATION NUMBER: 53 FR 18643
Date: TUESDAY, MAY 24, 1988

TEXT:
... having certain trading characteristics would be subject to different size limits. After studying the trading, volume and price patterns of all NASDAQ/NMS securities, the NASD has determined to amend File No. SR...

... for a security traded on SOES, the NASD will consider the average daily non-block volume , bid price , and number of market makers for each security. The NASD believes that by setting forth...

... and provide that the SOES market maker for any NASDAQ/NMS security must execute individual orders equal in the aggregate to the minimum exposure limit. The amendment to proposed paragraph (B) under this section is...
19880524

2/3,KWIC/13 (Item 1 from file: 564)
DIALOG(R)File 564:ICC Brit.Co.Ann.Rpts

10407616
HANSON PLC - 1999 Annual Report and Accounts
1 GROSVENOR PLACE
LONDON
SW1X 7HJ
TEL: 020 7245 1245
FX: 020 7235 3455

Publication Date: 991231
ICC Report Number: 315115, Page 21 of 57
Country Coverage: UNITED KINGDOM

Publication Date: 991231

TEXT
...0 93.9 +3.3
Return on sales 16.0% 16.3 -0.3ppts

	% Change volume	% Change price
Crushed rock	+3.5	+0.8
Asphalt	-0.6	+4.7

- Sand & gravel +3.0...

...which revealed that many of our customers wanted a faster, more efficient service when placing orders for aggregates and asphalt.

MARINE

Profit from our marine business rose 0.8% to L11.7m in...

2/3,KWIC/14 (Item 1 from file: 610)
DIALOG(R)File 610:Business Wire

00096730 19990830242B1201 (USE FORMAT 7 FOR FULLTEXT)
Ashton Technology Sucessfully Launches Volume Weighted Average Pric Trading System On the Philadelphia Stock Exchange
Business Wire
Monday, August 30, 1999 09:17 EDT
JOURNAL CODE: BW LANGUAGE: ENGLISH RECORD TYPE: FULLTEXT
DOCUMENT TYPE: NEWSWIRE
WORD COUNT: 445

Ashton Technology Sucessfully Launches Volume Weighted Average Pric Trading System On the Philadelphia Stock Exchange
19990830

TEXT:
The Ashton volume
weighted average price (VWAP(R)) trading system, a unique pre-opening pricing and execution system for the matching of large equity orders at the volume weighted average price , began trading on the The Philadelphia Stock Exchange (PHLX), on Friday, August 27, 1999.

In...
...phase of the rollout. Pre-opening
trades were matched and assigned Ashton's benchmark daily volume weighted average price at the end of the day, computed from all trades during the day and reported...

...the system's volume growth and
liquidity through the addition of larger broker-dealers, who aggregate orders from multiple locations," Mr. Rittereiser said.

The VWAP trading system allows institutional money managers and

broker-dealers to execute the most active NYSE-listed securities at a precise volume weighted price with the assurance of complete anonymity.
?
In its current phase, the VWAP system permits enrolled...

2/3,KWIC/15 (Item 1 from file: 613)
DIALOG(R)File 613:PR Newswire

00494464 20010116SFTU048 (USE FORMAT 7 FOR FULLTEXT)
Mobshop Selected by Whn(TM) (Whatshotnow.Com(R), Inc.) to Power Dem Aggregation Within Its Licensed Merchandise Marketplace
PR Newswire
Tuesday, January 16, 2001 08:37 EST
JOURNAL CODE: PR LANGUAGE: ENGLISH RECORD TYPE: FULLTEXT
DOCUMENT TYPE: NEWSWIRE
WORD COUNT: 850

20010116

TEXT:
...that allows the marketplace to generate high-volume transactions and improve iiquidity. The technology automatically aggregates orders from multiple buyers in real-time, provides volume -based dynamic pricing functionality, and includes proprietary tools to promote viral sales.

...fragmented for suppliers to reach in a cost-effective manner, and are looking for competitive volume purchase price savings.

Sellers within WHN Exchange gain access to the market of small and mid-sized businesses that will aggregate purchase orders into large, volume transactions. Buyers place orders within a designated Supply-Cycle(SM) purchasing period...

...seller-initiated commerce format in which small or individual orders come together for group discounts. Orders are automatically aggregated then distributed to individual retailers through the

fulfillment
process.

"Demand aggregation is critical to tapping...

2/3,KWIC/16 (Item 1 from file: 767)
DIALOG(R)File 767:Frost & Sullivan Market Eng

00903930

MARKET ENGINEERING RESEARCH FOR STRUCTURAL IMPACTS OF E- BUS EUROPEAN CHEMICALS INDUSTRY: Business Function Interaction Dynamics: e-Business Impacts on Distribution: Solution Implementation

Main Title: STRUCTURAL IMPACTS OF E-BUSINESS ON THE EUROPEAN CHEM
Pub. Date: May 2001
Source: Frost & Sullivan
Telephone: US (415) 961 - 1000; London 071 730 3438
Word Count: 581 (1 pp.)
Language: English

Country: EUROPE
Industry: CHEMICALS
Company Names (DIALOG Generated): Business

...a corresponding type of customer. Distributors do
not offer the same functionalities to a low volume , price -driven
customer
such as a one-off purchaser of commodities, compared to a high volume...

...based, on one side, on offering
more control over the products to big accounts and aggregate small
orders . On the other side, it is a matter of integrating all
distribution
competitors, from stock...

Full Date: 200105

2/3,KWIC/17 (Item 1 from file: 995)
DIALOG(R)File 995:NewsRoom 2001

0279045524 15HG1EGM
Strategic behavior and price discovery.(research information)
Medrano, Luis Angel
Vives, Xavier
RAND Journal of Economics, v32, n2, p221
Friday, June 22, 2001
JOURNAL CODE: APEJ LANGUAGE: English RECORD TYPE: Fulltext
DOCUMENT TYPE: Trade Journal ISSN: 0741-6261
WORD COUNT: 19,900

20010622

...i submits a market order contingent on the information he receives.

Noise traders (in the aggregate) submit an order u. Market makers a re risk neutral and set prices efficiently conditional on the observa...

...type [X.sub.ni]([s.sub.i], [p.sup. n-1]). Noise traders submit the aggregate order [u.sub.n]. Alternativ ely, we could think that noise comes from a garbled communication cha nnel in the transmission of orders or from the aggregation procedure of the order flow. In this case, market makers have a noisy observati on of the order flow...FOSTER, F.D. AND VISWANATHAN, S. "The Effect of Public Information and Competition on Trading Volume and Price Volatility." Review of Fi nancial Studies, Vol. 6 (1993), pp. 23-56.

-- AND --. "Strategic Trading...and market makers quote prices efficiently on the basis o
f public information and the aggregate limit order book, which is jus t a noisy version of the aggregate orders of informed agents, [L.sub. n]([p.sub.n]) = [Mu][y.sub.n]([p.sub...

2/3;KWIC/18 (Item 2 from file: 995)
DIALOG(R)File 995:NewsRoom 2001

0266018149 15GN0KR4
MobShop Launches New Rev of Selling App Group buying technology provi
MobShop introduces MobShop Seller 4.0
Online Reporter (US), pN/A
Monday, May 28, 2001

JOURNAL CODE: AKER LANGUAGE: ENGLISH RECORD TYPE: Fulltext
DOCUMENT TYPE: Trade Journal
WORD COUNT: 207

20010528

TEXT:
...which prices fall or value increases as more buyers join in. It automatically coordinates and aggregates orders from multiple buyers into high-volume, collaborative transactions, allowing buyers to take advantage of a...

...contracts or immediate spot market buys so buyers can aggregate demand based on pre-negotiated volume / price tiers. MobShop Seller now also has integrated communication tools that facilitate purchasing group formation and...

2/3,KWIC/19 (Item 3 from file: 995)
DIALOG(R)File 995:NewsRoom 2001
(c) 2005 The Dialog Corporation. All rts. reserv.

0221069123 15CU23J2
Indiana University Replaces Computers Every Three Years.(Brief Artic l e)
College Planning & Management, v4, n3, p12
Thursday, March 1, 2001
JOURNAL CODE: AQNE LANGUAGE: English RECORD TYPE: Fulltext
DOCUMENT TYPE: Magazine ISSN: 1523-0910
WORD COUNT: 203

20010301

TEXT:
...fabric of the university." The program has achieved substantial s avings for the university through aggregating large equipment orders and negotiating volume pricing agreements with vendors. Savings to da te are estimated at $5 million.
?

References

Admati, A., and P. Pfleiderer, 1988. A theory of intraday patterns: volume and price variability, Review of Financial Studies 1, 3-40.

Barclay, A., and R. Litzenberger, Warner J...

19980800

2/3,KWIC/3 (Item 2 from file: 75)

00214733 SUPPLIER NUMBER: 20522724 (USE FORMAT 7 FOR FULL TEXT

Deutsche mark-dollar volatility: intraday activity patterns, macroeconomic announcements, and longer run dependencies.

Andersen, Torben G.; Bollerslev, Tim

Journal of Finance, v53, n1, p219(47)
Feb, 1998
ISSN: 0022-1082 LANGUAGE: English RECORD TYPE: Fulltext; Abstract
WORD COUNT: 16530 LINE COUNT: 01405

... show up in statistics such as the trade balance and international capital flows. However, the aggregate net customer order flow is the variable of primary interest, and dealers only get to interpret the fraction...

...have a strong inventory control motive for trade, interdealer trade will not reveal, or perfectly aggregate , the information in order flows. In such settings, multiple trading rounds may be informative, even in the absence of...investigated subsamples.

REFERENCES

Admati, Anat R., and Paul Pfleiderer, 1988, A theory of intraday patterns: Volume and price variability, Review of Financial Studies 1, 3-40.

Andersen, Torben G., 1994, Stochastic autoregressive volatility...

19980200

2/3,KWIC/4 (Item 3 from file: 75)

00164017 SUPPLIER NUMBER: 14411235 (USE FORMAT 7 FOR FULL TEXT

Trading and manipulation around seasoned equity offerings. (includes appendix)

Gerard, Bruno; Nanda, Vikram

Journal of Finance, v48, n1, p213(33)
March, 1993
ISSN: 0022-1082 LANGUAGE: English RECORD TYPE: Fulltext; Abstract
WORD COUNT: 8717 LINE COUNT: 00783

... multiple informed traders. The secondary market is cleared by a market maker who absorbs the aggregate order flow from nondiscretionary liquidity traders and the informed trader. In the seasoned equity issue, the...

...the secondary market but do not participate in the SO.(5) We assume that the aggregate liquidity order flow |Q.sub.L
|element of
{-1, 0, 1} is distributed as follows:
|Q.sub...

...1985), the informed trader market order |Q.sub.I
is batched with the liquidity traders aggregate order |Q.sub.L
. The market maker clears the secondary market and absorbs the net order...less than or equal to
1/3 requires that the distribution of the liquidity traders aggregate order flow does not put more probability mass in the tails than the uniform distribution.
A...2|Kappa
|V.sup.-
+ |e.sup.-2|Kappa
|V.sup.+
}.
Here, irrespective of the trading volume , price adjustments are only due to inventory effects and are thus temporary. There is, therefore, no...

19930300

2/3,KWIC/5 (Item 4 from file: 75)

00154124 SUPPLIER NUMBER: 12538016 (USE FORMAT 7 FOR FULL TEXT

Time and the process of security price adjustment. (includes appendix)

Easley, David; O'Hara, Maureen
Journal of Finance, v47, n2, p577(29)
June, 1992
ISSN: 0022-1082 LANGUAGE: English RECORD TYPE: Fulltext; Abstract
WORD COUNT: 13336 LINE COUNT: 01091

... we study in this paper. One reason is that in a batch-clearing system, the aggregation of orders obliterates the information revealed by nontrading intervals. As we show, the lack of trade can...buys, sales, and no trades matters (indeed, determines prices), the total amount of trade or volume affects price behavior. In particular, because volume is related to the number of no-trade outcomes and...

...given any price sequence, the distribution of future quotes and prices will differ depending on volume . So although price -based technical analysis is valuable, price and volume-based technical analysis is even more valuable...the expected liquidity based volume per period. Then Proposition 5 shows that the level of volume and the price movement are related by the underlying event uncertainty.

Proposition 5: In the absence of an...information event all trades are from the informed does not remove the effects of normal volume on the price path. The reason is that in our model there still remains the uncertainty over whether...ARCH(1).

REFERENCES

Admati, A. R. and P. Pfleiderer, 1988, A theory of intraday patterns: Volume and price variability, Review of Financial Studies, 1, 3-40. Barclay, M. and R. Litzenberger, 1988, Announcement...Financial and Quantitative Analysis. 22, 109-121. Kim, O. and R. E. Verrecchia, 1991, Trading volume and price reactions to public information, Journal of Accounting Research 29, 302-321. Kyle, A. P., 1985...

19920600

2/3,KWIC/6 (Item 5 from file: 75)
DIALOG(R)File 75:TGG Management Contents(R)

00152991 SUPPLIER NUMBER: 12264073 (USE FORMAT 7 FOR FULL TEXT
Long-lived private information and imperfect competition.
Holden, Craig W.; Subrahmanyam, Avanidhar
Journal of Finance, v47, n1, p247(24)
March, 1992
ISSN: 0022-1082 LANGUAGE: English RECORD TYPE: Fulltext; Abstract

Refine Search

Search Results -

Terms	Documents
L30 and (pric$ with (time or period or duration))	8

Database:
US Pre-Grant Publication Full-Text Database
US Patents Full-Text Database
US OCR Full-Text Database
EPO Abstracts Database
JPO Abstracts Database
Derwent World Patents Index
IBM Technical Disclosure Bulletins

Search: L37

Refine Search | Recall Text | Clear | Interrupt

Search History

DATE: Friday, May 13, 2005 Printable Copy Create Case

Set Name side by side	Query	Hit Count	Set Name result set
DB=USPT; THES=ASSIGNEE; PLUR=YES; OP=OR			
L37	L30 and (pric$ with (time or period or duration))	8	L37
L36	L30 and (creat$ with order$)	8	L36
L35	l32 and (past$ or histor$ or profil$)	5	L35
L34	l6 and (past$ or histor$ or profil$)	1	L34
L33	L32 and l6	1	L33
L32	L30 and (invoic$ or (manag$ with account$))	7	L32
L31	L30 and (quot$ or proposal or offer$)	11	L31
L30	L6 or l15 or l21	11	L30
L29	L22 and (relation$)	4	L29
L28	L15 and (relation$)	0	L28
L27	L6 and (relation$)	1	L27
L26	L6 and (pric$ with agree$)	1	L26
L25	L6 and (term$ with condition$)	1	L25

L24	L1 and (term$ with condition$)	0	L24
L23	L22 and "ge"	3	L23
L22	L21 and (byproduct or by$)	4	L22
L21	L14 and catalog$ and (shar$ with ship$) and @ad<=20010806	9	L21
L20	L15 and catalog$ and (shar$ with ship$)	0	L20
L19	L15 and catalog$	0	L19
L18	L15 and catalog$ and ship$	0	L18
L17	L16 and catalog$ and ship$	0	L17
L16	L15 and l14	1	L16
L15	6101484.pn.	1	L15
L14	705/26-28.ccls.	1773	L14
L13	L6 and (communicat$ with (manag$ or control$))	1	L13
L12	L6 and (access$ with control$)	1	L12
L11	L6 and (access$ with control?)	0	L11
L10	L6 and catalog$	1	L10
L9	L6 and (shar$ same ship$)	0	L9
L8	L6 and (shar$ with ship$)	0	L8
L7	L6 and ship$	1	L7
L6	6269343.pn.	1	L6

DB=PGPB,USPT,USOC,EPAB,JPAB,DWPI,TDBD; THES=ASSIGNEE; PLUR=YES; OP=OR

L5	L4	2	L5

DB=USPT; THES=ASSIGNEE; PLUR=YES; OP=OR

L4	((person$ near3 shop$) same portab$) and remote$ and pos	2	L4

DB=PGPB,EPAB,JPAB,DWPI,TDBD; THES=ASSIGNEE; PLUR=YES; OP=OR

L3	(person$ near5 shop$) same remote$ same pos same portabl$	0	L3
L2	L1	0	L2

DB=EPAB,JPAB,DWPI,TDBD; THES=ASSIGNEE; PLUR=YES; OP=OR

L1	(person$ near3 shop$) same remote$ same pos same portabl$	0	L1

END OF SEARCH HISTORY

Hit List

Clear | Generate Collection | Print | Fwd Refs | Bkwd Refs | Generate OACS

Search Results - Record(s) 1 through 10 of 11 returned.

☐ 1. Document ID: US 6876977 B1

L30: Entry 1 of 11 File: USPT Apr 5, 2005

US-PAT-NO: 6876977
DOCUMENT-IDENTIFIER: US 6876977 B1

TITLE: Shared shopping basket management system

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De

☐ 2. Document ID: US 6418441 B1

L30: Entry 2 of 11 File: USPT Jul 9, 2002

US-PAT-NO: 6418441
DOCUMENT-IDENTIFIER: US 6418441 B1

TITLE: Methods and apparatus for disseminating product information via the internet using universal product codes

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De

☐ 3. Document ID: US 6338050 B1

L30: Entry 3 of 11 File: USPT Jan 8, 2002

US-PAT-NO: 6338050
DOCUMENT-IDENTIFIER: US 6338050 B1

TITLE: System and method for providing and updating user supplied context for a negotiations system

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De

☐ 4. Document ID: US 6336105 B1

L30: Entry 4 of 11 File: USPT Jan 1, 2002

US-PAT-NO: 6336105
DOCUMENT-IDENTIFIER: US 6336105 B1

TITLE: System and method for representing data and providing electronic non-repudiation in a negotiations system

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De

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☐ 5. Document ID: US 6332135 B1

L30: Entry 5 of 11 File: USPT Dec 18, 2001

US-PAT-NO: 6332135
DOCUMENT-IDENTIFIER: US 6332135 B1

TITLE: System and method for ordering sample quantities over a network

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De

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☐ 6. Document ID: US 6269343 B1 ✓

L30: Entry 6 of 11 File: USPT Jul 31, 2001

US-PAT-NO: 6269343
DOCUMENT-IDENTIFIER: US 6269343 B1
**** See image for Certificate of Correction ****

TITLE: On-line marketing system and method

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De

---

☐ 7. Document ID: US 6154738 A ✓

L30: Entry 7 of 11 File: USPT Nov 28, 2000

US-PAT-NO: 6154738
DOCUMENT-IDENTIFIER: US 6154738 A

TITLE: Methods and apparatus for disseminating product information via the internet using universal product codes

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De

---

☐ 8. Document ID: US 6141653 A

L30: Entry 8 of 11 File: USPT Oct 31, 2000

US-PAT-NO: 6141653
DOCUMENT-IDENTIFIER: US 6141653 A
**** See image for Certificate of Correction ****

TITLE: System for interative, multivariate negotiations over a network

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De

☐ 9. Document ID: US 6101484 A

L30: Entry 9 of 11 File: USPT Aug 8, 2000

US-PAT-NO: 6101484
DOCUMENT-IDENTIFIER: US 6101484 A

TITLE: Dynamic market equilibrium management system, process and article of manufacture

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De

☐ 10. Document ID: US 6016484 A

L30: Entry 10 of 11 File: USPT Jan 18, 2000

US-PAT-NO: 6016484
DOCUMENT-IDENTIFIER: US 6016484 A

TITLE: System, method and article of manufacture for network electronic payment instrument and certification of payment and credit collection utilizing a payment

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De

Clear | Generate Collection | Print | Fwd Refs | Bkwd Refs | Generate OACS

Terms	Documents
L6 or L15 or L21	11

Display Format: TI Change Format

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L7: Entry 1 of 1 File: USPT Jul 31, 2001

DOCUMENT-IDENTIFIER: US 6269343 B1
** See image for Certificate of Correction **
TITLE: On-line marketing system and method

Brief Summary Text (4):
The world Wide Web has provided a convenient mechanism for marketing products. Many web sites offer products for sale. Generally a potential customer viewing such a web site indicates a desire to buy a particular product by "clicking" on a particular location on the display screen. Some sites require a user to "register" by giving a name, address and credit card information. Later when a customer desires to buy a product the information entered during registration is used for billing and shipping. Other sites allow a customer to enter billing and shipping information after the customer has indicated a desire to purchase a particular product.

Detailed Description Text (45):
Next, if the time or date limit of the offers has not passed (block 32) the system displays the offer on one or more web sites (block 33). The display will have the elements of information shown in FIG. 2. A buyer who sees the offer on a web site can then indicate a desire to join the Buying Team for this offer by "clicking" button 28. At this point the buyer will provide billing and shipping information (unless it was previously provided during a registration process) and the buyer must indicate the amount of product desired (block 34). This is the individual buyer's "demand" level for this offer.

Detailed Description Text (53):
In a situation where offers are accepted (block 37) the buyers' credit cards are charged, the product is shipped to the buyers, and commissions are calculated and paid. If for example the system is being operated by one entity and the products are actually being sold by a different entity, the system operator may receive a pre-negotiated commission and the actual seller will receive the remainder of the selling price.

Detailed Description Text (62):
The system will present forms (block 64) to collect information from the potential buyer, presenting the forms either on the same web page where the offer was presented or on separate web pages linked to that first web page. The buyer enters the amount (e.g. the volume or number of units) they are interested in buying if this offer goes through (block 65). This is the potential buyer's individual "demand" level. For example, if the offer is for soccer balls, the user might indicate an interest in buying 5 balls. The potential buyer also provides his or her billing information (for example, credit card number and expiration date and billing address), shipping address, and contact information (block 66). Preferably an e-mail address is provided as part of the contact information. The potential buyer then gets a chance to confirm whether he or she really wants to join the Buying Group after all (block 67).

Detailed Description Text (70):

After determining the final price (block 72), each potential buyer is charged (block 73) using the credit card information previously supplied by each buyer (block 66). Each buyer is charged the price times the number of units they are buying (as they indicated previously in block 65), plus any applicable tax and shipping & handling charge (if any). The system keeps track of which buyers were successfully charged. In some cases, credit card charges may not go through--for example, if a potential buyer's credit card has expired or is over its credit limit. In alternative embodiments, the system can automatically create invoices for buyers who prefer to be billed rather than paying by credit card.

Detailed Description Text (71):
The system notifies the seller that the offer has gone through, and provides the shipping and contact information for each successfully charged Buyer (block 74). The seller then ships the number of units requested by each successfully charged buyer (block 65) to that buyer. In alternative embodiments, the Seller could ship all of the units, in bulk, to a fulfillment company or to the System operator, who would handle shipping subsets of the units to individual Buyers.

Detailed Description Text (72):
In the case where the thing being purchased is a service, rather than a product, the seller would perform the purchased service for the buyer, rather than shipping any product.

Detailed Description Text (73):
Finally, successfully charged buyers are notified that the offer has been accepted, that they have been charged, and that the products are on their way (block 75). Potential buyers who were not successfully charged are notified (block 75) about the unsuccessful charge and no product is shipped to them.

Detailed Description Text (78):
If the parties are all distinct from one another, the System Operator 93b and each Media Generator Operator 94 will (in a preferred version of this embodiment) receive a commission or royalty on each sale facilitated through each Media Generator Operator's web site 95. Using the above example, ABC Corp. could create a Group Buy offer for a certain product, using a system like the one illustrated in FIG. 9 (operated by a potentially unrelated Operator 93b) to present those offers on multiple affiliate web sites including BBB Corp.'s web site and CCC Corp.'s web site. If enough demand is aggregated in time for that Group Buy offer to be accepted, then the System's Controller 93 will charge the buyers (including shipping and sales tax), pay BBB Corp. and CCC Corp. a commission based on the number of items sold through their respective web sites during this offer and the price of those items (or a fixed amount per item), retain another commission for the System's Operator 93b based on the total number of items sold through this offer and the price of those items (or a fixed amount per item), and pay the Seller 91 the remainder.

Detailed Description Text (95):
The products offered for sale using the various embodiments of the invention can be products that are offered for sale by the System Operator. Alternatively, the System Operator can merely provide facility that is used by others to offer products for sale. If it is the System Operator that is offering products for sale, when an offer is accepted, the System Operator (or an agent of the System Operator) will ship the product to the buyer. If the System Operator is merely providing a facility for others to offer products for sale, when an offer is accepted, the product will typically be shipped to the Buyer by the actual Seller (or by an agent for the Seller). In such a case the System Operator will only receive a commission for operating the system and the remainder of the purchase price will go to the actual Seller.

L12: Entry 1 of 1 File: USPT Jul 31, 2001

DOCUMENT-IDENTIFIER: US 6269343 B1
**** See image for Certificate of Correction ****
TITLE: On-line marketing system and method

Detailed Description Text (16):
Sellers' client terminals 14 can be any of the various types of terminals that are available such as computers, laptops, thin-clients, WebTVs, Interactive TVs, PDAs, Information Appliances, or any other device that can be used by sellers to access the system's controller 13 over a network, so sellers can specify offers of goods and services

Detailed Description Text (18):
The System Operator 13b utilizes a conventional client terminal to access and configure the system's controller 13 as is conventional with computer systems and network servers.

Detailed Description Text (19):
The buyers' client terminals 14 are any of the various conventional terminals that are used to access web sites such as computers, laptops, thin-clients, WebTVs, two-way TV, PDAs, information appliances, or any other devices that buyers can use to view or hear offers presented by controller 13. Buyers also respond to offers using client terminals 14.

10

L23: Entry 2 of 3 File: USPT Nov 28, 2000

DOCUMENT-IDENTIFIER: US 6154738 A
TITLE: Methods and apparatus for disseminating product information via the internet using universal product codes

Application Filing Date (1):
19990521

Detailed Description Text (33):
The present invention provides significant advantages and opportunities to manufacturers. Information which manufactures now distribute in other ways can be made immediately available to those who need or desire that information. Examples include text and graphics which describe and promote the sale of each product to potential buyers; product labeling information, some of which may be required to be made available to potential buyers such as product weights and volumes, ingredients, nutritional facts, dosage and use instructions, some or all of which is now included on product packaging and which can be reproduced as mixed text and graphics HTML page for viewing by distributors, retailers, advertisers, catalog publishers, potential customers and purchasers; logos, photographs of products, and other graphics files in a variety of resolutions for use by both electronic and print rendering to promote product sales, usage and support. Instructional and service information including self-help diagnostics and recommended solutions, product part lists and ordering information, product return procedures, current pricing information, identification of dealers and distributors, warranty and guarantee explanations, and support telephone numbers may be provided.

Detailed Description Text (39):
consisting of the protocol identifier "http://" and by the 32-bit IP address from the product code translator written in its standard four decimal number format (four three digit numbers separated by periods, each of which is a value in the range 0-255 representing the binary value of one of the four 8-bit bytes making up the 32-bit IP address).

Detailed Description Text (43):
It is frequently desirable to transfer to another computer data created by the manufacturer which provides limited product description information for each product offered to enable more efficient indexing, cataloging, inventory control, and other applications. By way of example, in the bookselling industry, publishers, distributors, retailers, and libraries often require a database of bibliographic information which consists, for each book, of the book title, author name(s), publisher's name, publication date, type of book (hardcover, paperback, etc.), page count, recommended retail price(s), and ISBN number (which takes the form of a subpart of the EAN universal product code). To the extent the content and format of data records which describe particular classes of products in particular industries and trade groups have been previously adopted and placed in widespread use, those structured data records may advantageously be made available utilizing the present invention. This is preferably achieved in two ways: a data record (file) containing such field-structured information about each product which is designated by a universal product code is placed by the manufacturer in the directory it creates for that product. This structured data record is given a filename indicative of the format used to store the structured data. For example, each directory bearing a

name corresponding to the EAN number for a book would preferably contain a file named "biblio.dat" which contains a single structured record containing bibliographic data describing that book.

Detailed Description Text (46):
This ability to obtain accurate and up-to-date product information from the manufacturer can substantially reduce the cost to resellers, catalog producers, and database vendors which is traditionally incurred in capturing this data by conventional means. For example, a retailer creating a computerized inventory control system for the first time with previously purchased merchandise may use a conventional hand-held barcode scanner to capture the universal product codes from all goods in inventory, and then retrieve complete and accurate product description records for each product via the Internet using the present invention.

Detailed Description Text (53):
In addition, the present invention may be used to advantage in combination with Electronic Data Interchange, a standard mechanism for exchanging business documents in standard format between computers. EDI systems typically use value added networks (VANs), such as the networks provided by GE, IBM Atlantis and Sterling, or EDI transfers can be made via the Internet using services such a those provided by EDI Network of Turnersville, N.J. Using EDI, manufacturers make available electronic catalog descriptions of their products being offered for distribution and resale. When a buyer selects products of interest to order from the vendor's catalog, the retailer's computer accesses the vendor's computer to transfer the U.P.C. codes to the retailer's computer without rekeying. The retailer may then issue an EDI 850 purchase order transaction which is sent to the vendor's mailbox. In addition, the EDI system may transfer limited additional information to the retailer, such as suggested retail price. When the products are shipped, an EDI 856 shipping notice is sent to the retailer containing bill of lading information (bill of lading number, carrier and weight), purchase order information, and carton contents using U.P.C. product codes and counts. The vendor also sends an EDI 810 invoice to the retailer in EDI format which enables the retailer to process the invoice and schedule payment either by check or electronic funds transfer, using an EDI 830 remittance advice transaction to give payment details for invoices being paid.

Detailed Description Text (121):
The World Wide Web Consortium has further defined the "Resource Description Framework (RDF) and Syntax Specification" as described at http://www.w3.org/TR/REC-rdf-syntax. RDF provides a foundation for processing metadata (i.e. "data about data") and provides interoperability between computers that exchange information on the Web. Using RDF, data about products and companies, which can be accessed in accordance with the invention by using universal product codes; can be used by search engines to provide access to such information, can be used to automatically catalog the content and content relationships at particular web sites, pages or libraries; can be used by intelligent software agents to facilitate the sharing and exchange of information about companies and products. Using RDF with digital signatures, the privacy preferences and policies of the owners of product and company information can be selectively protected to help build the "Web of Trust" needed for electronic commerce.

Detailed Description Text (133):
The shared server 430 and the web register module 420 added to the retailer's existing inventory control system 322 maintain a connection via the Internet or a dial-up modem pathway which permits the inventory control system 422 to upload to the shared server 430 changes to the products (specified by universal product code) being offered for sale, and the quantity on hand. Each time any sale is made by any point of sale register 421 in the physical retail store or by the web register 422, the quantity on hand value associated with the sold product's code is altered. Similarly, when stock is replenished, the inventory control system 422 reflects the

increased quantity on hand. The quantity on hand information passed as message information at 422 permits the shared sales server to maintain a database for each retailer served which indicates the products available for sale and the quantity on hand. When the quantity on hand equals or exceeds the quantity ordered, the on line order is accepted and passed at 434 from the shared server to the web register module 420 which posts the sale in the same way that a point of sale register posts a sale. The fact that the web register 420 performs the same functions as a conventional cash register enables the conventional inventory control system 422 to function in the normal way, with the exception that it must also update the product code and quantity on hand data maintained by the shared server. The fact that the shared server thus "knows" the inventory status allows the shared server to accurately inform the customer when shipment can be expected for goods on hand and when goods which must be replenished will be shipped with a delay. Orders sent to the inventory control system at 434 include the specification of products sold (by their universal product code designation) and the quantities of each sold, as well as address information for billing and shipping. Credit card transactions are handled on a shared basis using standard ecommerce software, either by sending encrypted credit card and other billing information to the retailer for handling, or actually performing the monetary transaction with the customer in its entirety on the shared server, and sending periodic payments and accounting records to the retailer.

Detailed Description Text (138):
If the user decides to purchase the described product, the "shopping basket" functions of the shared sales server 430 are used to complete the order. Because the shared server 430 maintains a database for that retailer containing the quantity on hand values for each product offered by that server, the customer can be immediately informed if the shipment cannot be made whereas, if the product is available at the retailer's store or warehouse, the online customer's order can be confirmed for prompt delivery. When the order is completed by the shared server 430, the order 434 which includes the identification of the customer (name, shipping address, etc.) and the identification of the products sold (universal product codes plus quantities sold) is transmitted to the retailer's inventory control system 420. As explained in more detail below in connection with FIG. 7, the shared server 430 adjusts the quantity on hand values in its database, and the inventory control system 420 updates its database, with a cross check between the two being made if desired to insure consistency and synchronization.

Detailed Description Text (146):
The invoicing module 507 provides invoicing, billing and charging capabilities, printing invoices to be sent to customers. The shared sales server may support billing in several ways: it may simply send orders to the invoicing module 507 including shipping information supplied by the customer using HTML forms; it may verify and accept credit card information and transmit that to the invoicing module 507 so that the actual credit card transaction is between the customer and the retailer, or it may complete the credit card transaction at the shared server, forwarding collected funds together with accounting information to the retailer on a periodic basis.

Current US Cross Reference Classification (3):
705/26

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(6)

L25: Entry 1 of 1 File: USPT Jul 31, 2001

DOCUMENT-IDENTIFIER: US 6269343 B1
**** See image for Certificate of Correction ****
TITLE: On-line marketing system and method

CLAIMS:

1. A system for aggregating demand for the purchase of at least one product by a plurality of individual buyers comprising:

a controller;

seller terminals which communicate with said controller whereby sellers can enter and transmit, prior to the beginning of a specified and limited time period, to said controller, a conditional sales offer for said at least one product, said conditional sales offer specifying prices which are dependent upon the total number of said at least one product associated with said conditional sales offer purchased in the specified and limited time period;

web pages which display said conditional sales offer;

a plurality of individual buyer terminals which communicate with said controller whereby said plurality of individual buyers can indicate to said controller an acceptance of said conditional sales offer for the at least one product, and;

said controller calculating the price from among the specified prices for said at least one product dependent upon said conditional sales offer and an aggregate amount of said at least one product that said plurality of individual buyers have collectively indicated a willingness to purchase during said specified and limited time period.

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(7)

L26: Entry 1 of 1 File: USPT Jul 31, 2001

DOCUMENT-IDENTIFIER: US 6269343 B1

**** See image for Certificate of Correction ****

TITLE: On-line marketing system and method

Abstract Text (1):

The present invention provides a method and system that allows sellers to communicate conditional offers to potential buyers. The conditions include prices that depend on the aggregate amount of goods or services that buyers collectively agree to purchase by a given time and date. The invention facilitates "demand aggregation", that is, aggregating demand by potential buyers (who may or may not know each other), for products offered by sellers. This invention allows sellers conveniently to offer "Demand-Based Pricing", that is, prices which go down as the volume of units sold in any given offer goes up. A seller can therefor offer volume discounts to buyers acting as a group, even when the buyers may not have any formal relationship with one another.

Brief Summary Text (9):

The present invention provides a marketing method and system that aggregates demand and provides demand based pricing. With the present invention sellers can communicate conditional offers to potential buyers. The conditions include prices that depend on the amount of goods or services that buyers collectively agree to purchase by a given time and date. The invention facilitates "demand aggregation", that is, aggregating demand by potential buyers (who may or may not know each other), for products offered by sellers. This invention allows sellers to conveniently offer "Demand-Based Pricing", that is, prices which go down as the volume of units sold in any given offer goes up. A seller can therefor offer volume discounts to buyers acting as a group, even when the buyers may not have any formal relationship with one another.

Detailed Description Text (87):

In still other embodiments of this invention, sellers could specify different types of thresholds. For example, sellers could offer a special price if enough people agree to purchase exactly 500 units (in aggregate) of a given item (e.g. because the seller has exactly 500 units to sell). Or they could offer a special price if potential buyers agree to purchase at least 500 units (in aggregate) if the deal goes through (e.g. because the seller has more than 500 units available for sale).

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L29: Entry 3 of 4 File: USPT Nov 28, 2000

DOCUMENT-IDENTIFIER: US 6154738 A
TITLE: Methods and apparatus for disseminating product information via the internet using universal product codes

Application Filing Date (1):
19990521

Detailed Description Text (12):
As seen in FIG. 1, the product code translator 101 may be advantageously implemented by a server computer which stores information in a relational database consisting of the tables depicted in FIG. 2. If desired, the product code translator 101 may be implemented with a plurality of "mirrored" servers at different locations, or clustered servers at the same location containing the same cross-referencing data to share the processing burden and provide redundant fault-tolerant reliability. In addition, different servers or sets of mirrored or clustered servers may be used to process different assigned subsets of the gamut of universal product codes. Whether one or many servers is used, each may be preferably implemented using conventional server hardware and conventional server operating system software, such as Microsoft NT Server, Netscape Application Server, SCO Unixware, Sun Enterprise Server, and the like.

Detailed Description Text (17):
The information contained in the incoming registration template 207 is used to create records (rows) in three separate tables in the relational database: a company table 211, a URL table 213 and a cross-reference table 215. As seen in FIG. 2, the company table 211 includes a numerical company number field CoNo which is also present in the cross-reference table 215 so that each cross-reference table row can be related to a particular company description record in the company table which has the same CoNo value. The key field CoNo establishes a one-to-many relationship between the company table 211 and the cross-reference table 215 since a participating company identified by a unique CoNo value may register more than one set of universal product codes, potentially associated with different IP-addresses, requiring more than one row in the cross-reference table 215.

Detailed Description Text (20):
The separate URL table 213 has a one-to-many relationship to the cross-reference table 215 and uses the 32-bit IP address value as the relational key. This arrangement allows a single URL base address to be shared by a plurality of different manufacturers. Thus, for example, a single Internet service provider (ISP) may act as a shared Internet resource for storing data about a products originating from many different manufacturers. It is accordingly unnecessary for each manufacturer to operate its own server or have its own assigned URL. Instead, a manufacturer may place its product descriptions on any server having an assigned Internet address. Note that it is further unnecessary for the manufacturer to have, or supply, an assigned URL rather than a numerical IP address; however, since corresponding URL's are ordinarily available and easer to remember, and because it may be desirable to later change numerical IP addresses while retaining the same URL, the use of URL's for registration is preferred.

Detailed Description Text (33):

The present invention provides significant advantages and opportunities to manufacturers. Information which manufactures now distribute in other ways can be made immediately available to those who need or desire that information. Examples include text and graphics which describe and promote the sale of each product to potential buyers; product labeling information, some of which may be required to be made available to potential buyers such as product weights and volumes, ingredients, nutritional facts, dosage and use instructions, some or all of which is now included on product packaging and which can be reproduced as mixed text and graphics HTML page for viewing by distributors, retailers, advertisers, catalog publishers, potential customers and purchasers; logos, photographs of products, and other graphics files in a variety of resolutions for use by both electronic and print rendering to promote product sales, usage and support. Instructional and service information including self-help diagnostics and recommended solutions, product part lists and ordering information, product return procedures, current pricing information, identification of dealers and distributors, warranty and guarantee explanations, and support telephone numbers may be provided.

Detailed Description Text (39):
consisting of the protocol identifier "http://" and by the 32-bit IP address from the product code translator written in its standard four decimal number format (four three digit numbers separated by periods, each of which is a value in the range 0-255 representing the binary value of one of the four 8-bit bytes making up the 32-bit IP address).

Detailed Description Text (43):
It is frequently desirable to transfer to another computer data created by the manufacturer which provides limited product description information for each product offered to enable more efficient indexing, cataloging, inventory control, and other applications. By way of example, in the bookselling industry, publishers, distributors, retailers, and libraries often require a database of bibliographic information which consists, for each book, of the book title, author name(s), publisher's name, publication date, type of book (hardcover, paperback, etc.), page count, recommended retail price(s), and ISBN number (which takes the form of a subpart of the EAN universal product code). To the extent the content and format of data records which describe particular classes of products in particular industries and trade groups have been previously adopted and placed in widespread use, those structured data records may advantageously be made available utilizing the present invention. This is preferably achieved in two ways: a data record (file) containing such field-structured information about each product which is designated by a universal product code is placed by the manufacturer in the directory it creates for that product. This structured data record is given a filename indicative of the format used to store the structured data. For example, each directory bearing a name corresponding to the EAN number for a book would preferably contain a file named "biblio.dat" which contains a single structured record containing bibliographic data describing that book.

Detailed Description Text (46):
This ability to obtain accurate and up-to-date product information from the manufacturer can substantially reduce the cost to resellers, catalog producers, and database vendors which is traditionally incurred in capturing this data by conventional means. For example, a retailer creating a computerized inventory control system for the first time with previously purchased merchandise may use a conventional hand-held barcode scanner to capture the universal product codes from all goods in inventory, and then retrieve complete and accurate product description records for each product via the Internet using the present invention.

Detailed Description Text (53):
In addition, the present invention may be used to advantage in combination with Electronic Data Interchange, a standard mechanism for exchanging business documents in standard format between computers. EDI systems typically use value added

networks (VANs), such as the networks provided by GE, IBM Atlantis and Sterling, or EDI transfers can be made via the Internet using services such a those provided by EDI Network of Turnersville, N.J. Using EDI, manufacturers make available electronic catalog descriptions of their products being offered for distribution and resale. When a buyer selects products of interest to order from the vendor's catalog, the retailer's computer accesses the vendor's computer to transfer the U.P.C. codes to the retailer's computer without rekeying. The retailer may then issue an EDI 850 purchase order transaction which is sent to the vendor's mailbox. In addition, the EDI system may transfer limited additional information to the retailer, such as suggested retail price. When the products are shipped, an EDI 856 shipping notice is sent to the retailer containing bill of lading information (bill of lading number, carrier and weight), purchase order information, and carton contents using U.P.C. product codes and counts. The vendor also sends an EDI 810 invoice to the retailer in EDI format which enables the retailer to process the invoice and schedule payment either by check or electronic funds transfer, using an EDI 830 remittance advice transaction to give payment details for invoices being paid.

Detailed Description Text (60):
The Perl program show.pl, listed in detail in the microfiche appendix, is a CGI (Common Gateway Interface) program which executes on a Web server and which operates as a product code translator as seen at 101 in FIG. 1. This illustrative program uses a file-based database rather than the relational database depicted in FIG. 2. The database consists of a set of files, each of which is designated by a file name consisting of a company code followed by the suffix ".xrl" and each containing cross-referencing information for all product codes beginning with that company code. The Perl program show is specially adapted to locate information on books which are generated by a universal product code known as the International Standard Book Number (ISBN), a nine digit decimal number followed by a check character, used by the publishing houses, book distributors, retail bookstores and libraries to uniquely identify books. A variable number of leading digits of each ISBN designate particular publishers, with the remaining digits being assigned by that publisher to designate a particular edition of a particular book.

Detailed Description Text (68):
The relationship between any given ISBN and the URL which identifies the source of information about the book designated by the ISBN is selected by the party (typically the publisher or its designated agent) which controls the server which provides that information. Because different publishers and their web site hosts may use different methods for establishing URLs for their book information, the Perl script show.pl operates in different ways depending on the company code $cc which forms the leading digits of the incoming ISBN.

Detailed Description Text (118):
The manner in which explicit relationships between two or more data objects, such as a retailer's product list page and the product information about a product listed on that page, may be expressed as a link asserted in elements contained in XML documents. These "XLinks" in the simplest case are like the HTML links described above in that they are expressed at one end of the link only, are initiated by users to initiate travel to the other end of the link, go only to one destination (which may be determined by a DNS server or by an independent cross-referencing server), and produce an effect which is mainly determined by the browser. The functionality of links is being vastly extended, however, by the XML Linking Language (XLink) specification being developed by the World Wide Web Consortium and available at http://www.w3.org/TR/WD-xlink. As extended, the XLink specification will provide more sophisticated multi-ended and typed links which can be used to advantage to automatically incorporate linked-in product information from one or more manufacturers into displays and multimedia presentations presented by retailers and others.

Detailed Description Text (121):
The World Wide Web Consortium has further defined the "Resource Description Framework (RDF) and Syntax Specification" as described at http://www.w3.org/TR/REC-rdf-syntax. RDF provides a foundation for processing metadata (i.e. "data about data") and provides interoperability between computers that exchange information on the Web. Using RDF, data about products and companies, which can be accessed in accordance with the invention by using universal product codes; can be used by search engines to provide access to such information, can be used to automatically catalog the content and content relationships at particular web sites, pages or libraries; can be used by intelligent software agents to facilitate the sharing and exchange of information about companies and products. Using RDF with digital signatures, the privacy preferences and policies of the owners of product and company information can be selectively protected to help build the "Web of Trust" needed for electronic commerce.

Detailed Description Text (123):
Using these techniques, the product manufacturer may be largely freed from concerns about web page design, formatting and integration with other information, and may concentrate on providing accurate and up-to-date text descriptions of its products, along with whatever images best describe the product, simply by registering the relationship between the manufacturers company code and/or universal product code (s) with the appropriate authority, and following the established content specifications for the information which the manufacturer makes available at the registered IP address.

Detailed Description Text (133):
The shared server 430 and the web register module 420 added to the retailer's existing inventory control system 322 maintain a connection via the Internet or a dial-up modem pathway which permits the inventory control system 422 to upload to the shared server 430 changes to the products (specified by universal product code) being offered for sale, and the quantity on hand. Each time any sale is made by any point of sale register 421 in the physical retail store or by the web register 422, the quantity on hand value associated with the sold product's code is altered. Similarly, when stock is replenished, the inventory control system 422 reflects the increased quantity on hand. The quantity on hand information passed as message information at 422 permits the shared sales server to maintain a database for each retailer served which indicates the products available for sale and the quantity on hand. When the quantity on hand equals or exceeds the quantity ordered, the on line order is accepted and passed at 434 from the shared server to the web register module 420 which posts the sale in the same way that a point of sale register posts a sale. The fact that the web register 420 performs the same functions as a conventional cash register enables the conventional inventory control system 422 to function in the normal way, with the exception that it must also update the product code and quantity on hand data maintained by the shared server. The fact that the shared server thus "knows" the inventory status allows the shared server to accurately inform the customer when shipment can be expected for goods on hand and when goods which must be replenished will be shipped with a delay. Orders sent to the inventory control system at 434 include the specification of products sold (by their universal product code designation) and the quantities of each sold, as well as address information for billing and shipping. Credit card transactions are handled on a shared basis using standard ecommerce software, either by sending encrypted credit card and other billing information to the retailer for handling, or actually performing the monetary transaction with the customer in its entirety on the shared server, and sending periodic payments and accounting records to the retailer.

Detailed Description Text (138):
If the user decides to purchase the described product, the "shopping basket" functions of the shared sales server 430 are used to complete the order. Because the shared server 430 maintains a database for that retailer containing the

quantity on hand values for each product offered by that server, the customer can be immediately informed if the shipment cannot be made whereas, if the product is available at the retailer's store or warehouse, the online customer's order can be confirmed for prompt delivery. When the order is completed by the shared server 430, the order 434 which includes the identification of the customer (name, shipping address, etc.) and the identification of the products sold (universal product codes plus quantities sold) is transmitted to the retailer's inventory control system 420. As explained in more detail below in connection with FIG. 7, the shared server 430 adjusts the quantity on hand values in its database, and the inventory control system 420 updates its database, with a cross check between the two being made if desired to insure consistency and synchronization.

Detailed Description Text (141):
The relationship between the shared sales server seen at 403 in FIG. 6 and the retailer's inventory control system seen at 420 in FIG. 6 is shown in more detail in FIG. 7 of the drawings. As discussed above, the remote shared sales server operates, from the standpoint of the inventory control system, much in the same way as a conventional point of sale terminal. The other components of the inventory control system include essentially conventional purchasing, receiving, order processing, shipping and invoicing functions described in the literature. See, for example, the texts Best Practice in Inventory Management, by Tony Wild, John Wiley & Sons; ISBN: 0471253413 (March 1998) and Inventory Control and Management by C. D. J. Waters, John Wiley & Sons; ISBN: 0471930814 (June 1992).

Detailed Description Text (146):
The invoicing module 507 provides invoicing, billing and charging capabilities, printing invoices to be sent to customers. The shared sales server may support billing in several ways: it may simply send orders to the invoicing module 507 including shipping information supplied by the customer using HTML forms; it may verify and accept credit card information and transmit that to the invoicing module 507 so that the actual credit card transaction is between the customer and the retailer, or it may complete the credit card transaction at the shared server, forwarding collected funds together with accounting information to the retailer on a periodic basis.

Detailed Description Text (147):
It is a principle feature of this aspect of the invention that the retail merchant, who already maintains a physical inventory and/or a distribution relationship with manufacturers, as well as an inventory control system for managing its inventory and distribution functions, performs the order fulfillment function using facilities which are shared with those used by conventional "showroom" sales facility. The shared sales server merely processes data, and need not be concerned with the actual selection, purchase or distribution of physical products, nor with the creation of the detailed product information needed by the consumer when making online purchases. Both of these functions remain where they are best performed, with the retailer and the manufacturer respectively.

Detailed Description Text (151):
The relationship between retail stores, manufacturers and distributors, product information services and consumers, and the computers connected to the Internet which utilize the invention to serve each of these entities, is depicted in FIG. 8 of the drawings.

Current US Cross Reference Classification (3):
705/26

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L35: Entry 3 of 5 File: USPT Aug 8, 2000

DOCUMENT-IDENTIFIER: US 6101484 A
TITLE: Dynamic market equilibrium management system, process and article of manufacture

Abstract Text (1):
A dynamic market equilibrium management system is especially adapted for the sale of goods and services through an online buying group (referred to herein as a "co-op`) formed for the specific purpose of purchasing a particular product at (102) by defining a start time, end time, critical mass, any minimum number of units offered, any maximum number of units offered, starting price and product cost curve. As data is gathered from buyers, by means of their making binding purchase offers, the co-op is modified at (108) using the market equilibrium manager, so as to take into account market forces such as supply and demand for the item to be sold and their interrelationship with the purchase price for such item. When used with the online buying group, the dynamic market equilibrium management system permits dynamic, real time yield management decisions based on true market data. A graphical user interface receives user inputs for directly manipulating graphical display of data from a database on a display device and displays feedback dependent variable data on the display device, such as in the form of a changed numerical value in response to the user moving at least one data point in the graphical display.

Brief Summary Text (11):
Historically there has been no way for a supplier to predict with certainty the price at which a product must be sold in order to increase sales volume by a specified amount. Under traditional sales models, pricing decisions are made based on estimates, such as anticipated product demand and presumed price sensitivity, in the hope that supply will approximate demand at the selected price. If a supplier of a particular item could rely on guaranteed purchase offers to increase volume at varying levels of acceptable sales prices and utilize a tool to quickly and skillfully define market equilibrium, such a tool would be extremely valuable to the supplier. Among other things, it would permit instantaneous, accurate yield management decisions that often would encourage win-win price reductions. The supplier wins by improving his overall yield based on volume, and the buyer wins by getting a lower per unit price.

Detailed Description Text (9):
As data is gathered from buyers, by means of their making offers, the co-op is modified using the market equilibrium manager, so as to take into account the market data in the definition of the price curve set. FIG. 3B shows such a modified curve set early in the history of the co-op. An additional change shown in FIG. 3B from the price curve set shown in FIG. 3A is that cost curve 100 and minimum price curve 102, corresponding respectively to the curves 100 and 102 in FIG. 3A, are in three segments to reflect typical volume discounts. The market equilibrium manager code is configured to allow such modifications to be made directly on the displayed curves through use of a mouse or other pointing device. The minimum offer threshold curve 106 has also been modified in FIG. 3B to give an inflection at 108 by dragging data point 110 with a mouse. As a result, some previous offers that were below the threshold curve 106 and above the minimum price curve 102 and thus ignored for the purpose of modifying the price curve 104 for the co-op, are now

used to modify the price curve 104. This has the effect of modifying the price curve 104 as shown. Also shown in FIG. 3B is a histogram 112 of the total of 164 committed offers (see the data in block 114) that have been deemed acceptable at this point in the co-op because the maximum price at which they were made was equal to or greater than the current price of $2014 on price curve 104 for that volume of sales. The data at 114 also shows that a total of 216 acceptable offers have been used to modify the price curve 104 and that the co-op will produce a gross margin of $172,036. As merchandising staff modify the curve set shown in FIGS. 3A-3E to test "what if" scenarios, immediate direct numeric feedback on the effect of those modifications is given in the data of block 114.

Other Reference Publication (13):
Online Document from Agorics, Inc., http://www.agorics.com/, Sections: "A Survey of Auctions," English Auction, A Dutch Auction, The First Price Auction, The Vickrey Auction, The Double Auction, Auction Offshoots, Auction Strategies Auction Histories Government Securities--Auctioned Off, Collusion in Auctions, Auction Bibliography, Dated 1996, Reprinted Oct. 25, 1999.

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First Hit Fwd Refs Previous Doc Next Doc Go to Doc#

End of Result Set

Generate Collection Print

L36: Entry 8 of 8 File: USPT Jan 18, 2000

DOCUMENT-IDENTIFIER: US 6016484 A
TITLE: System, method and article of manufacture for network electronic payment instrument and certification of payment and credit collection utilizing a payment

Application Filing Date (1):
19960426

Detailed Description Text (90):
This message represents the consumer order entry and the clicking of the `Calculate Order` button. The consumer's shopping experience is all condensed into this one message flow for the purpose of highlighting the payment process. The actual implementation of the shopping process varies, however, the purpose does not, which is the creation of the order.

Detailed Description Text (139):
The application in accordance with a preferred embodiment also shares payment and shipping information with the merchant and URLs from merchants which a consumer has frequented before linkage for visitation.

Current US Cross Reference Classification (3):
705/26

Other Reference Publication (270):
Trommer, D., ECS Catalog Merges EDI/Net Platforms: Enables Online Ordering in EDI Format Over Net, EBN, (May 20, 1996) p. 54.

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46 47

L37: Entry 5 of 8 File: USPT Jul 31, 2001

DOCUMENT-IDENTIFIER: US 6269343 B1
** See image for Certificate of Correction **
TITLE: On-line marketing system and method

Abstract Text (1):
The present invention provides a method and system that allows sellers to communicate conditional offers to potential buyers. The conditions include prices that depend on the aggregate amount of goods or services that buyers collectively agree to purchase by a given time and date. The invention facilitates "demand aggregation", that is, aggregating demand by potential buyers (who may or may not know each other), for products offered by sellers. This invention allows sellers conveniently to offer "Demand-Based Pricing", that is, prices which go down as the volume of units sold in any given offer goes up. A seller can therefor offer volume discounts to buyers acting as a group, even when the buyers may not have any formal relationship with one another.

Brief Summary Text (9):
The present invention provides a marketing method and system that aggregates demand and provides demand based pricing. With the present invention sellers can communicate conditional offers to potential buyers. The conditions include prices that depend on the amount of goods or services that buyers collectively agree to purchase by a given time and date. The invention facilitates "demand aggregation", that is, aggregating demand by potential buyers (who may or may not know each other), for products offered by sellers. This invention allows sellers to conveniently offer "Demand-Based Pricing", that is, prices which go down as the volume of units sold in any given offer goes up. A seller can therefor offer volume discounts to buyers acting as a group, even when the buyers may not have any formal relationship with one another.

Detailed Description Text (39):
FIGS. 3 is an overall flow diagram of the operation of the system. The process begins with a seller making an offer to sell a particular product at specified prices which depend upon the amount of the product that can be sold in a particular time period (block 31). For example, a seller might indicate that he would sell a particular type of soccer ball at the following prices:

Detailed Description Text (60):
Presenting an offer on a web site involves displaying several pieces of information associated with the offer. In the preferred embodiment, the system 13 presents offers on one or more web sites as in accordance with the program flow diagram shown in FIG. 5. For each offer presented, the system will display the following information as entered by the seller or as calculated by the system controller 13: the offered product's description (block 51); the Demand Thresholds and associated Prices (block 52) and the Maximum Available Amount (if one was specified by the seller); the Aggregate Demand so far (block 53)--i.e. the total amount that potential buyers have expressed an interest in buying (in aggregate) since the start of the offer; and optionally, the number of buyers in the Buying Group so far (block 53); the date and time limit for the offer (block 54) as entered by the seller (46); an optional status message (block 55) (e.g. "Just 2 days left! We need to sell twelve more units to get the best discount price!"); and a "Join Buy Team"

button (block 56) that potential buyers can dick if they are interested in joining the buying group for this offer. In an alterative embodiment, potential buyers can click on another part of the screen displaying the offer to indicate their interest in participating in the offer. In such an embodiment, the "Join Buy Team" button would be optional. (The "Join Buy Team" button can also go by other names, such as "Buy Now" or simply "Buy".)

Detailed Description Text (70):
After determining the final price (block 72), each potential buyer is charged (block 73) using the credit card information previously supplied by each buyer (block 66). Each buyer is charged the price times the number of units they are buying (as they indicated previously in block 65), plus any applicable tax and shipping & handling charge (if any). The system keeps track of which buyers were successfully charged. In some cases, credit card charges may not go through--for example, if a potential buyer's credit card has expired or is over its credit limit. In alternative embodiments, the system can automatically create invoices for buyers who prefer to be billed rather than paying by credit card.

CLAIMS:

1. A system for aggregating demand for the purchase of at least one product by a plurality of individual buyers comprising:

a controller;

seller terminals which communicate with said controller whereby sellers can enter and transmit, prior to the beginning of a specified and limited time period, to said controller, a conditional sales offer for said at least one product, said conditional sales offer specifying prices which are dependent upon the total number of said at least one product associated with said conditional sales offer purchased in the specified and limited time period;

web pages which display said conditional sales offer;

a plurality of individual buyer terminals which communicate with said controller whereby said plurality of individual buyers can indicate to said controller an acceptance of said conditional sales offer for the at least one product, and;

said controller calculating the price from among the specified prices for said at least one product dependent upon said conditional sales offer and an aggregate amount of said at least one product that said plurality of individual buyers have collectively indicated a willingness to purchase during said specified and limited time period.

8. A method for marketing at least one product to a plurality of individual buyers that operates in accordance with a specified and limited time period, said method comprising the steps of:

receiving, prior to the beginning of a specified and limited time period, from sellers at a controller, connected to a network, a conditional sales offer for said at least one product, said conditional sales offer specifying prices which are dependent upon the total number of said at least one product associated with the respective conditional sales offer purchased in said specified and limited time period;

providing said plurality of individual potential buyers with said conditional sales offer for said at least one product through said network;

receiving from said plurality of individual potential buyers at the controller an indication of an acceptance of said conditional sales offer for said at least one

product;

said controller calculating a price from among the specified prices for said at least one product dependent upon the conditional sales offer and an aggregate amount of said at least one product that said plurality of individual potential buyers have collectively indicated a willingness to purchase in said specified and limited time period; and

communicating to said plurality of individual potential buyers and said sellers the price of said at least one product at the end of said specified and limited time period.

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Let us now compare the purely monopolistic version of the model whe re the unique informed agent is a large informed trader (that is, [Mu] = 1) with the competitive economy ([Mu] = 0). Proposition 2 is a sp ecialization of Proposition 1 letting [Mu] = 1 and showing the existe nce and uniqueness of a linear equilibrium.

Proposition 2. If [Mu] = 1, there is a unique linear equilibrium. I t is given by

[Y.sub.n](v, [p.sup.n-1]) = [[Alpha].sub.n] (v - [p.sup.n-1]), E {[[Pi].sub.n+1] | v, [p.sup.n]} = [H.sub.n][(v - [p.sub.n]).sup.2] + [[Delta].sub.n],

and

[p.sub.n]= [[Lambda].sub.n][[Omega].sub.n] + [p.sub.n-1],

where

[MATHEMATICAL EXPRESSION NOT REPRODUCIBLE IN ASCII]

The constants [[Alpha].sub.n], [H.sub.n], and [[Delta].sub.n] are t he unique solution to the difference equation system
(1) [[Alpha].sub.n] =(1/(2[[Lambda].sub.n]))([[Gamma].sub.n] - 2[[L ambda].sub.n][H.sub.n](1 - [[Gamma].sub.n])]/[[Gamma].sub.n] - [[Lamb da].sub.n][H.sub.n]](1 - [[Gamma].sub.n])])

(2) [H.sub.n] = (1 - [[Lambda].sub.n+1])[[Alpha].sub.n+1])(1 - [[Ga mma].sub.n+1])[H.sub.n+1](1 - [[Lambda]-n+1][[Alpha].sub.n+1])]

(3) [[Delta].sub.n] = (1 - [[Gamma].sub.n+1])[[Delta].sub.n+1] + [H .sub.n+1][([[Lambda].sub.n).sup.2]/[[Tau].sub.u],

subject to the boundary conditions [A.sub.N] = 0, [[Delta].sub.n] = 0, [a.sub.N][[Lambda].sub.N] = 1/2, and the second-order conditions [[Lambda].sub.n][[[Gamma].sub.n] - (1 - [[Gamma].sub.1]))[[Lambda].su b.n][H.sub.n]] [is greater than] 0 for all n = 1, 2, ..., N.

Lemma A1 in the Appendix provides an iterative method to compute th e equilibrium. It follows from Lemma A1 that [MATHEMATICAL EXPRESSION NOT REPRODUCIBLE IN ASCII] and that the sequence {[[Lambda].sub.t] [H.sub.t]} is determined by the sequence {[[Lambda].sub.t]}. Therefore , the sequence {[[Tau].sub.n]/[[Tau].sub.v]]} only depends on the seq uence {[[Lambda].sub.n]}. This means in particular that price precisi on and

market depth are independent of noise trading. As in Kyle (198 5), the result is a consequence of the risk neutrality of the strateg ic informed trader. It also follows that 2 [is less than or equal to] [[Tau].sub.n]/[[Tau].sub.v] [is less than or equal to] [2.sup.n].

The strategic informed trader trades according to [Y.sub.n](v, [p.s up.n-1]) = [[Alpha].sub.n](v - [p.sub.n-1]). At stage n, if he places a market order and there is no trade, his future profit will decreas e because of the information revealed to the market makers. But if he does not submit any order and trade is consummated, his future profi t will be zero because v will have been revealed. It never pays to se t a negative trading intensity [[Alpha].sub.n]. Indeed, [[Alpha].sub. n] [is less than] 0 is dominated by [[Alpha].sub.n] = 0: If there is trade, with [[Alpha].sub.n] [is less than] 0 the strategic informed t rader makes negative profits while it makes zero with [[Alpha].sub.n] = 0; if there is no trade, with [[Alpha].sub.n] = 0 no information i s revealed to the market makers while with [[Alpha].sub.n] [is less t han] 0 some information is revealed. In fact, when [[Gamma].sub.1] = 0 it is optimal not to trade (and set [[Alpha].sub.n] = 0), since the market will not open. The optimal market order, which balances the t wo effects, implies a trading intensity that is lower than in the one -shot model where there is trading with probability one. Moreover, it seems intuitive that [[Alpha].sub.n] should be increasing in the pro bability [[Gamma].sub.n] (this is confirmed by the simulations below) . In the one-shot model of Kyle (1985), [[Lambda].sub.1][[Alpha].sub. 1] = 1/2. In our monopolistic economy, [[Lambda].sub.n][[Alpha].sub.n] [is less than] 1/2 for all n [is less than] N and [[Lambda].sub.N][[Alpha].sub.N] = 1/2 (since at t = N the model becomes static, as in Kyle). This means that the large informed agent refrains from trading too aggressively because there is a positive probability that there is no trade.

An important result is that for the central case where [[Gamma].sub .n] = [[Gamma].sup.N-n], and in contrast to the competitive economy, no matter how long the horizon, the price precision is bounded above (and the bound depends only on the parameter [Gamma]). In this case t he monopolistic strategic informed trader prevents the full revelatio n of v no matter how many rounds the tatonnement has. The following c orollary states the result.

Corollary 2. If [[Gamma].sub.n] = [[Gamma].sup.N-n] for any given [Gamma], then there is [bar]N such that for N [is greater than] [bar]N , increases in N just move the schedule [[Tau].sub.n] (as a function of n) to the right. In particular, [[Tau].sub.N] = [[Tau].sub.[bar]N] for N [is greater than] [bar]N. Let [bar][Tau]([Gamma]) be the limit value of the price

precision. Then [bar][Tau]([Gamma])/[[Tau].sub.v] is increasing, convex with [bar][Tau](0) = 0, and tends to infinity as [Gamma] tends to one.

The proof of the corollary follows immediately from Proposition 2 a nd Lemma A1. The function [bar][Tau]([Gamma]) is computable. For exam ple, [bar][Tau](.4) = 2.8[[Tau].sub.v] and [bar]N(.4) = 10, [bar][Tau](.6) - 5.4[[Tau].sub.v] and [bar]N(.6) = 18, [bar][Tau](.8) - 50.6[[Tau].sub.v] and [bar]N(.8) = 49, [bar][Tau](.9) = 6086.2[[Tau].sub.v] . However, it is easy to construct sequences of probabilities [[Gamma].sub.n] such that [bar][Tau] is infinite. Indeed, just let, for all n, [[Gamma].sub.n] be close to one. For example, [[Gamma].sub.n] = [Y .sub.n-1] + (.1/N) is increasing with [[Gamma].sub.n] [is greater tha n or equal to] .9, and [[Tau].sub.N] grows exponentially with N. This type of probabilities sequence is not reasonable for our purposes, g iven that there is a very high probability that the market opens in e very period. The key property for the result in the corollary to hold is that the probability that the market opens, [[Gamma].sub.n] tends to zero as the number of rounds until the opening N - n tends to inf inity.

We shall now present a simulation analysis and discussion of the ma in properties of the equilibrium of the monopolistic version of the m odel, comparing it with the competitive version and assuming the same time horizon in both cases.
In the numerical examples in Figures 1-3, it is assumed that [MATHE MATICAL EXPRESSION NOT REPRODUCIBLE IN ASCII]. and [MATHEMATICAL EXPR ESS REPRODUCIBLE IN ASCII]. Here are the results we obtain.

[GRAPHS OMITTED]

[] Responsiveness to private information. In both the competitive a nd the monopolistic equilibria, the responsiveness to private informa tion increases monotonically with n (see Figure 1). For n small, the strategic informed trader's responsiveness to private information [[A lpha].sub.n] is very close to zero, since the probability that there will be trade is low at those stages. In the competitive equilibrium, the aggregate responsiveness to private information [a.sub.n] increa ses to a = [[Tau].sub.[Epsilon]]/[Rho]. The response of the strategic informed trader may overtake that of the competitive agents close to the end of the horizon, provided the private signals of the competit ive agents are not very precise ([[Tau].sub.[Epsilon]] low).

[] Informativeness of prices. In the competitive economy, [[Tau].su b.n] increases monotonically at a rate of n. In the monopolistic equi librium, [[Tau].sub.n] is also monotonically increasing, but the rate of increase

accelerates close to the opening (see Figure 2). In gene ral, the informativeness of prices is higher in the competitive equil ibrium for n small, because at those rounds of the tatonnement proces s the monopolist strategic informed trader is very reluctant to submi t orders. But for n close to N, when the probability that there will be trade is relatively high, the informativeness of prices may be hig her in the monopolistic equilibrium. This is more likely to happen if the noise in the private signals of the agents in the competitive ec onomy is high. For N large, however, we know that the price precision in the competitive economy must dominate the one in the monopolistic economy, since the former grows without bound while the latter is bo unded.

[] Market depth. In the competitive equilibrium, the depth of the m arket [([[Lambda].sub.n]).sup.1] tends to infinity at a rate of n. In the monopolistic equilibrium, the market depth in general decreases during the first rounds of the tatonnement process and then increases as the probability that there will be trade tends to one. If n is sm all, the probability that there will be trade is relatively low. As a consequence, the strategic informed trader's trading intensity ([[Al pha].sub.n]) is low, and the market is quite deep because the order f low is likely to reflect the demand of the noise traders. In this cas e the market makers are willing to trade because the adverse selectio n problem they face is not severe. As n increases, the strategic info rmed trader behaves more aggressively (because of the higher probabil ity of trading), the order flow is more likely to reflect the demand of the strategic informed trader, the market makers are less willing to trade, and market depth decreases. Finally, if n is large and clos e to N, the market makers have a very good estimate of v because of t he success of the tatonnement process, and the strategic informed tra der's informational advantage is small.(22)

[] Unconditional volatility of prices. In both the competitive and the monopolistic economies, the unconditional volatility of prices va r [p.sub.n] increases monotonically toward [MATHEMATICAL EXPRESSION N OT REPRODUCIBLE IN ASCII]. In the competitive economy, however, var [p.sub.n] gets close to [MATHEMATICAL EXPRESSION NOT REPRODUCIBLE IN A SCII] in first few rounds of tatonnement but at the same time is close to zero in the monopolistic economy (because the market depth i s extremely high).(23)

[] Expected trading volume. In the competitive economy, the expecte d volume traded by informed agents is decreasing for n large. On the contrary, the expected volume traded by the strategic informed trader in the monopolistic economy increases monotonically. The rate of inc rease is very low for n small, and then it accelerates as n gets clos e to N (and as the probability that there will be trade approaches on e). This qualitative

feature of the monopolist equilibrium has been f ound to be robust to wide parameter ranges (provided that the sequenc e of probabilities {[[Gamma].sub.n]} has the form proposed, [[Gamma]. sub.n] = [[Gamma].sup.N-n]).(24) It should be clear that

[MATHEMATICAL EXPRESSION NOT REPRODUCIBLE IN ASCII]

will be increasing if the rate of increase of [[Alpha].sub.n] is su fficiently high, even though the informativeness of prices [[Tau].sub .n-1] increases with n as well.

The volume traded by informed agents drives the expectation of the total trading volume. This decreases to a constant ([(2/2[Pi]).sup.1/ 2]{1 /([[Sigma].sub.[Epsilon][Rho]) + 2[[Sigma].sub.u]}) in the compet itive model, while it increases monotonically in the monopolistic mod el. But since the volume traded by noise traders is constant in both models, the rate of increase of the total volume as n gets close to N is lower than the rate of increase of the volume traded by the monop olistic informed agent (see Figure 3).

5. The dynamics in the general case: market manipulation

* The most remarkable property of the equilibrium strategies (given in Proposition 1) when the strategic informed trader and the competi tive informed sector coexist is that the strategic informed trader's responsiveness to private information may be negative for n not too c lose to the end of the horizon. A negative response to private inform ation may be interpreted as an attempt to manipulate the market. This is so because the strategic informed trader does something that is o pposite to what his private information suggests, namely, at stage n to buy when v [is less than] [p.sub.n-1] and to sell when v [is great er than] [p.sub.n-1]. Indeed, the strategic informed trader's demand is given by [Mu][Y.sub.n](v, [p.sub.n-1]) = [Mu][[Alpha].sub.n](v - [p.sub.n-1]), so that if [[Alpha].sub.n] [is less than] 0, the strateg ic informed trader's demand is negative if and only if v [is greater than] [p.sub.n-1]. That is, if [[Alpha].sub.n] [is less than] 0, the strategic informed trader submits a sell order when the liquidation v alue of the asset is "high" and the expected return conditional in hi s information is positive. The purpose of doing so is to manipulate t he informativeness of prices. It is an attempt to counteract the info rmation incorporated in prices arising from the demands of the compet itive informed agents. Indeed, if prices are very informative with a few rounds of tatonnement, due to the activity of the competitive inf ormed agents, then the strategic informed trader's opportunities to m ake a killing are greatly diminished. In general, the

more informatio n market makers have, the more (informationally) efficient the price is and the lower the speculative profits of informed traders are.

How can the strategic informed trader manipulate the informativenes s of prices (and the depth of the market)? The informativeness of the price and the depth of the market depend on the average of the tradi ng intensities of the strategic and the competitive informed agents, [A.sub.n] = [[Mu][[Alpha].sub.n] + (1 - [Mu])[a.sub.n]]. Indeed, [[Ta u].sub.n] = [[Tau].sub.n-1] + [[Tau].sub.u][([A.sub.n]).sup.2] and [([[Gamma].sub.n]).sup.-1] = [A.sub.n] + ([[Tau].sub.n-1]/([[Tau].sub.u][A.sub.n])). The competitive informed agents will set a positive tra ding intensity provided their signals have positive precision, [[Tau] .sub.[Epsilon]] [is greater than] 0. By setting a negative [[Alpha].s ub.n], the strategic informed trader can decrease [A.sub.n]. However, it never pays the strategic informed trader to let [A.sub.n] [is les s than] 0. Indeed, the aggregate response to private information [A.s ub.n] is always nonnegative in equilibrium. To let [A.sub.n] [is less than] 0, the strategic informed trader should choose [[Alpha].sub.n] [is less than] -(1 - [Mu])[a.sub.n]/[Mu]. But choosing [[Alpha].sub. n] [is less than] -(1 - Mu])[a.sub.n]/[Mu] is worse than choosing [[Alpha].sub.n] = -(1 - [Mu])an /[Mu], since the expected loss in case t rade is realized would be higher, and the future expected profit in c ase there is no trading would be lower (because if [[Alpha].sub.n] [i s iess than] -(1 - [Mu])[a.sub.n]/[Mu], the price does reveal some in formation, while if [[Alpha].sub.n] = -(1 - [Mu])[a.sub.n]/[Mu], it d oes not).

When will the strategic informed trader manipulate the market? We s hall see that if at stage n [[Gamma].sub.n] is sufficiently low, [[Al pha].sub.n] [is less than] 0. In particular, if [[Gamma].sub.n] = 0, then [[Alpha].sub.n] = -(1 -[Mu])[a.sub.n]/[Mu] and [A.sub.n] = 0. If [a.sub.n] [is greater than] 0, then [[Alpha].sub.n] [is less than] 0 .(25) Indeed, if the probability of trade being realized ([[Gamma].su b.n]) is zero, the strategic informed trader's optimal response is to choose a trading intensity [[Alpha].sub.n] such that the price [p.su b.n] is uninformative ([A.sub.n] = [[Lambda].sub.n] = 0 and [p.sub.n] = [p.sub.n-1]). When there is no danger of the market opening, the s trategic informed trader trades in a way that no information is revea led by neutralizing the response of competitive informed agents. Give n that [A.sub.n] = [Mu][[Alpha].sub.n] + (1 - [Mu])[a.sub.n], with [a .sub.n] [is greater than] 0 and 0 [is less than] [Mu] [is less than] 1, this is done by setting [[Alpha].sub.n] = -[(1 - [Mu])/[Mu]][a.sub .n] [is less than] 0.(26) It is plausible then to expect that [[Alpha].sub.n] [is less than] 0 for [[Gamma].sub.n] low. It can be shown th at if [[Gamma].sub.1] is small enough, then at a linear equilibrium n ecessarily [[Alpha].sub.1] [is less than] 0, and therefore

there is m anipulation.(27) An important consequence, consistent with the simula tions reported below, is that in the central case ([[Gamma].sub.n] = [[Gamma].sup.N-n]) for N large, we will have market manipulation, [[A lpha].sub.n] [is less than] 0, in the first periods of the tatonnemen t.

At stage n [is less than] N, if 0 [is less than] [[Gamma].sub.n] [i s less than] 1, the strategic informed trader faces the following tra deoff. If trade were consummated, the optimal action would be to trad e as in the static model, choosing [[Alpha].sub.n] positive and relat ively high. If the market were not to open, the optimal response woul d be to choose a trading intensity [[Alpha].sub.n] so as to make the price [p.sub.n] uninformative ([A.sub.n] = 0 and [p.sub.n] = [p.sub.n -1]). He must balance reducing the informativeness of prices by choos ing a low (and possibly negative) trading intensity [[Alpha].sub.n] a nd trading intensely (choosing [[Alpha].sub.n] close to the static eq uilibrium value) to obtain a high profit if trades are executed. If [[Gamma].sub.n] = 1, the strategic informed trader behaves as in the s tatic version of the model so that his response to private informatio n is positive.

At any stage, the strategic informed trader's responsiveness to pri vate information should be increasing in the probability of trading a t that stage. If the strategic informed trader manipulates the market ([[Alpha].sub.n] [is less than] 0) and trade is realized, he will ha ve an expected loss. But if there is no trading, the strategic inform ed trader's future expected profit will be higher, since he will pres erve a greater informational advantage over other market participants . At stage n, the strategic informed trader's incentives to manipulat e the market should be decreasing in the probability of trading [[Gam ma].sub.n], or equivalently, [[Alpha].sub.n] increasing in [[Gamma].s ub.n]. By the same token, and since [[Gamma].sub.n] is increasing in n, [[Alpha].sub.n] should be increasing in n.

We now present a simulation analysis of the main properties of the equilibrium in the general model.(28) We have explored the behavior o f the model with [[Gamma].sub.n] = [[Gamma].sup.N-n] in the following parameter grid: [Rho] in { 1, 2, 4}, [[Tau].sub.u], [[Tau].sub.v], a nd [[Tau].sub.[Epsilon]] in {.5, 1, 2}, [Gamma] in {.2, .3, .5, .6, . 7, .8}, [Mu] in {.2, .5, .8} with N up to 30 rounds. As stated in Sec tion 3, for a moderate-horizon N it is reasonable to choose [Gamma] n ot too high so that the probability of trade is low at the beginning. We obtain the following results.

[] Summary of simulation results. Let 1 [is greater than] [Mu] [is greater than] 0 and [[Gamma].sub.n] = [[Gamma].sup.N-n]. Then the sim ulations

performed show that [[Alpha].sub.n] is increasing in n and i n [Gamma], [[Tau].sub.n] is strictly convex in n, and, provided N is large enough,

(i) there is always market manipulation, [[Alpha].sub.n] [is less t han] 0, in the first periods of the tatonnement;

(ii) the informativeness of prices is very low during the first sta ges and increases fast as n gets close to N;

(iii) the conditional volatility of prices var([p.sub.n] | [p.sub.n -1]) may be hump-shaped or increasing in n and the responsiveness to information of the competitive agents [a.sub.n] U-shaped or decreasin g; and

(iv) the total expected trading volume is U-shaped.

It is easy to generate speeds of learning close to those estimated by Biais, Hillion, and Spatt (1999). These authors estimate, in the p eriod in which prices are informative, an order of magnitude for the precision of prices [[Tau].sub.n] of [n.sup.3] instead of the order n obtained by Vives (1995) for the competitive model. In our model, if we fit a curve of the ype [Kn.sup.k] to [[Tau].sub.n] - [[Tau].sub. v] we easily find values for k close to 3 for a range of periods in w hich [[Tau].sub.n] is significantly different from [[Tau].sub.v]. For example, with [Rho] = [[Tau].sub.[Epsilon]] = [[Tau].sub.v] = [[Tau] .sub.u] = 1, [Mu] = .5, and N = 10, considering only periods for whic h [[Tau].sub.n] [is greater than] 1.05[[Tau].sub.v] we obtain that fo r [Gamma] = .4 (using the last four periods), k = 2.8; for [Gamma] = .5 (using the last six periods), k = 2.7; for [Gamma] = .6 (using the last nine periods), k = 2.6.

It is worth noting that the expected length of the tatonnement, for a fixed N, is decreasing in [Gamma]. As [Gamma] tends to one, expect ed length tends to one, and as [Gamma] tends to zero, expected length tends to N. A ow [Gamma] has the benefit of a "long" tatonnement bu t at the cost of introducing more price manipulation. A high [Gamma] means a "short" tatonnement with less or no price manipulation. If th e objetive is to maximize the expected informativeness of prices, an interior [Gamma] will be optimal.

To understand the trading dynamics of the competitive informed agen ts, it is important to understand the dynamic behavior of the conditi onal volatility var([p.sub.n] | [p.sub.n-1]). Information revelation by prices accelerates (decelerates) as n increases when var(v | [p.su b.n]) is concave (convex) in n. The following fact relates the two co nditional variances.

Fact. The conditional volatility of prices var([p.sub.n] | [p.sub.n -1]) is increasing (decreasing) in n if and only if var(v | [p.sub.n]) is concave (convex) in n.

Proof. We know that var ([p.sub.n] | [p.sub.n-1]) = [([[Tau].sub.n-1]).sup.-1] - [([[Tau].sub.n]).sup-1] and [[Tau].sub.n] = [(var(v | [p.sub.n])).sup.-1] We have then that var([p.sub.n+1] | [p.sub.n]) [is greater than or equal to] var([p.sub.n] | [p.sub.n-1]) if and only i f var(v | [p.sub.n]) - var(v | [p.sub.n+1]) [is greater than or equal to] var(v | [p.sub.n]-1) - var(v | [p.sub.n]). Rearranging terms, th e inequality is equivalent to var(v | [p.sub.n]) - var(v | [p.sub.n-1]) [is greater than or equal to] var(v | [p.sub.n+1]) - var(v | [p.su b.n]), and the result follows. Q.E.D.

This means that the conditional volatility of prices is increasing (decreasing) if and only if information revelation accelerates (decel erates) as n increases. Note also that if var(v | [p.sub.n]) is conca ve in n, then [[Tau].sub.n] = [(var(v | [p.sub.n])).sup.-1] is convex in n.

In the examples that follow, illustrated by the figures and parametrized by [Gamma] ranging from .2 to .7, it is assumed that N = 10, [R ho] = [[Tau].sub.v] = [[Tau].sub.[bar][Omega] = [[Tau].sub.[Epsilon]] = 1[and [Mu] = .5. We comment on the results of the simulations for [Mu] [is less than or equal to] .6.

The strategic informed trader manipulates the market at the beginni ng ([[Alpha].sub.n] [is less than] 0 for n low (Figure 4) except if [Gamma] = .7). As a result, the informativeness of prices is very low during the first stages and increases quite fast as n gets close to N (Figure 5). The conditional volatility of prices var([p.sub.n] | [p. sub.n-1]) may be hump-shaped or increasing in n (Figure 6), implying that the responsiveness to information of the competitive agents [a.s ub.n] is U-shaped ori decreasing, respectively (Figure 7). The last si tuation happens when y is low (y = .2). Then information revelation a ccelerates as the tatonnement progresses (var(v | [p.sub.n]) is conca ve in n). Otherwise, for larger [Gamma]'s, var(v | [p.sub.n]) is firs t concave and then convex in n, implying that var([p.sub.n] | [p.sub. n-1]) is first increasing and then decreasing in n (Figure 8).The tot al expected trading volume is U-shaped (Figure 9), and the result is driven by the fact that the strategic informed trader's expected trad ing volume is U-shaped (Figure 10). The explanation is as follows. Th e expected volume traded by informed traders (ignoring the volume tra ded among competitive informed agents) equals [Mu]E|[y.sub.n]| + E|[x .sub.n]| = ([Mu]|[[Alpha].sub.n]| + (1 - [Mu])[a.sub.n])[(var(v | [p. sub.n])).sup.1/2]. For [Gamma] not too high,

this volume will have a U-shaped temporal pattern. The reason is that |[[Alpha].sub.n]| has a U-shaped temporal pattern, and the same is true for [a.sub.n] except when [Gamma] is low, in which case the evolution of |[[Alpha].sub.n] | dominates and [Mu]|[[Alpha].sub.n]| + (1 - [Mu])[a.sub.n] also has a U-shaped temporal pattern. This in turn dominates the decreasing te ndency of var(v | [p.sub.n]).

[GRAPHS OMITTED]

A more detailed illustration of the simulations follows.

[] Responsiveness to private information. In Figure 4 we observe th at [[Alpha].sub.n] is increasing in [Gamma] and in n. The dynamic beh avior of [a.sub.n] depends on var([p.sub.n] | [p.sub.n-1]). In the pu rely competitive model ([Mu] - 0), [a.sub.n] increases monotonically to [a.sub.n] = [[Tau].sub.[Epsilon]]/[Rho]. In the presence of the st rategic informed trader, [a.sub.n] may be monotonically increasing, m onotonically decreasing, or U-shaped. If [Gamma] is sufficiently low (see Figure 7, [Gamma] = .2), the strategic informed trader will have very strong incentives to manipulate the market. As a result, prices will purvey almost no information during the first stages, and for n close to N, information evelation will accelerate (var(v | [p.sub.n])) concave in n (see Figure 8). This implies that var([p.sub.n] | [p .sub.n-1]) is monotonically increasing (see Figure 6), and as a direc t consequence, [a.sub.n] is also monotonically decreasing. On the con trary, if [Gamma] is sufficiently high (see Figure 4, [Gamma] = .7), the strategic informed trader will not manipulate the market, and inf ormation revelation will be fast from n = 1 and will decelerate with n(var(v | [p.sub.n])) convex in n (see Figure 8). Therefore, the cond itional volatility of prices will be monotonically decreasing and [a. sub.n] will be monotonically increasing. For intermediate values of [Gamma] ([Gamma] = .6, for example), var(v | [p.sub.n]) is first conca ve and then convex in n. Then, [a.sub.n] is U-shaped.

[] Informativeness of prices. The price precision [[Tau].sub.n] is monotonically increasing and convex in n (see Figure 5). The informat ional efficiency of the process is increasing in [Gamma]. If [Gamma] is very low (see Figure 5, [Gamma] = .2), the strategic informed trad er will have very strong incentives to manipulate the market, and pri ces will purvey almost no information until n gets very close to N. I f [Gamma] is sufficiently high relative to N (see Figure 5, [Gamma] = .7), the strategic informed trader will not manipulate the market, a nd information revelation will be relatively fast.

[] Market depth. In the purely competitive model ([Mu] = 0) the dep th of

the market tends monotonically to infinity at a rate of n, whil e in the monopolistic version of the model the depth of the market is generally U-shaped. In the general model, several patterns are possi ble. The depth of the market tends to be monotonically decreasing if [Gamma] is low and monotonically increasing if [Gamma] is high (see F igure 11, where [[Lambda].sub.n] is displayed), having a U-shaped pat tern for intermediate values.(29)

[GRAPH OMITTED]

[] Trading volume. The dynamics of trading volume display a variety of patterns. In the purely competitive model ([Mu] = 0), trading vol ume is decreasing (at least for n close to N), while in the purely mo nopolistic version of the model, trading volume is increasing. In the general version of the model, with 0 [is less than] [Mu] [is less th an] 1, expected trading volume may be increasing, decreasing, or U-sh aped.

The strategic informed trader's expected trading volume, [Mu]E|[[La nbda].sub.n]| = [Mu][(2/[Pi]).sup.1/2][([([[Alpha].sub.n]).sup.2] / [[Tau].sub.n-1]).sup.1/2], may be U-shaped or increasing depending on whether there is market manipulation or not (see Figure 10). if [Gamm a] is high, the strategic informed trader will choose [[Alpha].sub.n] [is greater than] 0 for all n. As n increases, [[Alpha].sub.n] will go up and, as in he purely monopolistic version of the model, the st rategic informed trader's expected trading volume will increase. On t he contrary, if [Gamma] is iow, the strategic informed trader will ch oose [[Alpha].sub.1] [is less than] 0. As n and [[Gamma].sub.n] incre ase, the incentives to manipulate the market decrease and, as a conse quence, [[Alpha].sub.n] increases. But this means that, since [[Alpha].sub.1] [is less than] 0, [([[Alpha].sub.n]).sup.2] decreases as [[A lpha].sub.n] gets close to zero. Therefore, for n low, the strategic informed trader's expected trading volume is decreasing since ([[Alph a].sub.n]).sup.2] is decreasing and the informativeness of past price s is increasing. As n gets close to N, the strategic informed trader chooses a positive and increasing [[Alpha].sub.n], and then his expec ted trading volume becomes increasing. In general, the strategic info rmed trader's expected trading volume is decreasing (increasing) if a nd only if the strategic informed trader's trading intensity is negat ive (positive).

The expected volume traded by competitive informed agents, E|[y.sub .in]| = [(2/[Pi]).sup.1/2][a.sub.n] [(1/[[Tau].sub.[Epsilon]] + 1/[[T au].sub.n-1]).sup.1/2], is monotonically decreasing. The result shoul d hold a fortiori in relation to the competitive model, since now the re are cases in which [a.sub.n] decreases with n. On the other hand, if y

increases, the expected volume traded by competitive informed ag ents tends to be smaller, since prices become more informative sooner .

The expected volume traded by market makers, E|[[Omega].sub.n]| = [(2 /[Pi]).sup.1/2] [([([[Sigma].sub.u]).sup.2] + [([A.sub.n]).sup.2]/[[Tau].sub.n-1])).sup.1/2] increases with [[Sigma].sub.u] and [A.sub.n], and decreases with [[Tau].sub.n-1]. Expected volume traded by mark et makers will be monotonically increasing in n since [[Tau].sub.n-1] increases more slowly than the average response to private informati on [A.sub.n] (because of the strategic behavior by the strategic info rmed trader).(30)

The expected total trading volume, [ETV.sub.n] = [(1/2[Pi]).sup.1/2](1 - [Mu])[a.sub.n][(1/[[Tau].sub.[Epsilon]] + 1/[[Tau].sub.n-1]).s up.1/2] + [Mu][([([[Alpha].sub.n]).sup.2] / [[Tau].sub.n-1]).sup.1/2] + [([([[Sigma].sub.u]).sup.2] + [([A.sub.n]).sup.2] / [[Tau].sub.n-1])).sup.1/2] + [[Sigma].sub.u]}, tends to be U-shaped if [Gamma] is l ow, as the strategic informed trader's expected trading volume is U-s haped. On he other hand, if [Gamma] is high, the expected trading vo lume coming rom he strategic informed trader increases fast and the expected trading volume coming from competitive informed agents decr eases relatively slowly. In this case, expected total trading volume will tend to be s monotonically increasing. [ETV.sub.n] is driven by th e trades of the strategic informed trader (see Figure 9).

We shall now briefly analyze the comparative dynamics of the equili brium with respect to the size of the strategic informed trader [Mu] and the horizon N.

[] Comparative dynamics with respect to [Mu]. If 1 [is greater than] [Mu]' [is greater than] [Mu] [is greater than] 0, then the simulati ons(31) show that [[Tau]'.sub.n] [is less than] [[Tau].sub.n], var [p '.sub.n] var [p.sub.n], and E[[TV'.sub.n]'] [is less than] E[[TV.sub. n]]. In general, we also have that |[[Alpha]'.sub.n]| [is less than] |[[Alpha].sub.n]| with the possible reversal of the inequality when t he [Alpha]'s are negative and close to zero. The effect of [Mu] on [a .sub.n] and [[Lambda].sub.n] is ambiguous. Furthermore, with the poss ible exception of short horizons, the expected utility of a single in formed competitive agent increases in the presence of the strategic i nformed trader and in his size [Mu]. The expected profit of the strat egic informed trader also increases with [Mu].

That is, in the economy in which the strategic informed trader is s maller (and the competitive sector larger), the strategic informed tr ader responds more to his private information, prices reveal more inf ormation

and are more volatile, and there is more trading. If [Mu]' [is greater than] [Mu], the effect of the strategic informed trader's demand on the price and on the informativeness of the price is higher , and he becomes more cautious. The expected trading volume is higher in the economy with a larger competitive sector. Indeed, the expecte d volume traded by the competitive sector is higher simply because th is sector is larger while the trade per agent is more or less the sam e. Furthermore, market makers trade more as well because they face a less severe adverse selection problem (except perhaps at the end of t he horizon). Finally, the expected volume traded by the strategic inf ormed trader, at least in the first periods, is higher since the lowe r the impact his demand has on prices, the higher his willingness to trade.(32)

The previous comparative dynamic results have interesting implicati ons for the relative welfare of the strategic informed trader and the competitive informed agents. The expected profits of the strategic i nformed trader in period n, conditional on there being trade in this period, are given by [Mu][[Alpha].sub.n]/[[Tau].sub.n]. The expected utility of a competitive informed agent, conditional on there being t rade in period n, is given by [(1 + [[Tau].sub.[Epsilon] / [[Tau].su b.n-1]).sup.-1/2]. Given that the presence of the strategic informed trader tends to make prices less informative (with the possible excep tion of short horizons), the competitive traders benefit (individuall y) from it. Furthermore, a larger strategic informed trader makes [[A lpha].sub.n] smaller (when positive) and the price precision [[Tau].s ub.n] also smaller. The simulations show that the expected profit, [M u][[Alpha].sub.n]/[[Tau].sub.n], in general increases with [Mu] (alth ough [[Alpha].sub.n]/[[Tau].sub.n] may decrease with [Mu]),(33) and t herefore the strategic informed trader prefers that the competitive s ector be small. We also find that the ex ante expected profit of the strategic informed trader (as of period 0) is increasing in [Mu].

In summary, an informed competitive trader prefers to have a large informed trader around because then prices are less informative and t he trader can profit from it, while the strategic informed trader pre fers a small competitive sector. The strategic informed trader is cre ating a positive externality for the competitive informed agents.

[] Comparative dynamics with respect to N. In the purely competitiv e economy ([Mu] = 0), increasing N increases the informativeness of p rices at the rate of N and decreases the volume of trading. In the pu rely strategic version of the model ([Mu] = 1), for any given [Gamma] there is an upper bound for the price precision [bar][Tau], no matte r the length N of the horizon. Our simulations support the conjecture that this is also

the case when [Mu] [is greater than] 0.(34)

For example, with [Mu] = .5, [Rho] = [[Tau].sub.[Epsilon]] = [[Tau] .sub.v] = [[Tau].sub.u] = 1, and [Gamma] = .5 as fixed exogenous para meters, we see that [a.sub.N], [[Alpha].sub.N], [[Tau].sub.N], [[Gamm a].sub.N], Var([p.sub.N] | [p.sub.N-1]), Var([p.sub.N]), and the expe cted volume traded by the different types of agents all change by les s than .001% when N increases from 10 to 20. A larger [Mu] implies a lower limit value for the price precision, and this limit is attained in fewer rounds of trade. Let [Rho] = [[Tau].sub.[Epsilon]] = [[Tau] .sub.v] = [[Tau].sub.u] = 1, and [Gamma] = .3. Then for [Mu] = .5, [b ar][Tau] = 3.416 and the bound is attained in about 10 rounds (up to 9 decimals); for [Mu] =. 1, [bar][Tau] = 5.416 and the bound is attai ned in close to 11 rounds; for [Mu] = .01, [bar][Tau] = 6.166 and the bound is attained in less than 15 rounds. In the first case we get w ithin less than 1% of the upper bound at N = 3; in the second, at N = 4; and in the third, at N = 5. Indeed, when [Mu] increases, the aver age responsiveness to information, [A.sub.n], tends to decrease, and this affects the informativeness of prices.

| Robustness. It is possible to show that the general pattern of r esults obtained also hold in the case that the strategic and the comp etitive informed agents use demand schedules instead of market orders: in the presence of the strategic informed trader there is market ma nipulation, price precision is bounded above, and volume is U-shaped.

. Concluding remarks

In this article we have provided a model of an information tatonn ement inspired in the preopening auction of some continuous trading s ystems. The interaction between a strategic informed trader and a sec tor of competitive informed agents yields outcomes consistent with th e empirical evidence available from the Paris Bourse (Biais, Hillion, and Spatt, 1999). Indeed, we see how the presence of the strategic i nformed trader slows down at first and later accelerates the transmis sion of information by prices. The price precision tends to increase sharply toward the end of the tatonnement. However, the price does no t fully reveal the fundamental value of the asset, no matter how many rounds the tatonnement has. Furthermore, trading volume displays a U -shaped pattern driven by the strategic informed trader's activity. A ll these robust findings in our model are consistent with the empiric al evidence.

At the same time, our model has characterized precisely the market-manipulation strategy of the strategic informed trader in terms of co ntrarian behavior. Indeed, the strategic informed trader attempts to

manipulate the market at the beginning of the process by taking an of fsetting position to the competitive informed traders. The aim of suc h a contrarian strategy is to keep the informativeness of prices low. Therefore, at the beginning there is quite a bit of contrarian activ ity that subsequently subsides to active trading in the direction of the information of the strategic informed trader. The presence of the strategic informed trader creates a public good for the competitive informed traders: A low informativeness of the price and opportunitie s to profit from it. On the other side of the coin, the strategic inf ormed trader would like to keep the competitive informed sector as sm all as possible.

In summary, the presence of strategic behavior in a context where t here are also competitive informed agents yields a temporal pattern o f evolution of basic market parameters consistent with the evidence a vailable in the pretrade period in the Paris Bourse. Furthermore, we uncover and characterize the use of a contrarian strategy by the stra tegic informed trader to manipulate the market. At the same time, the model makes clear that introducing a random opening time, like in Xe tra, limits but does not eliminate the incentives to manipulate the m arket. Market manipulation only arises in those periods in which the probability that the market opens is relatively low.
Among the direct extensions of the model that could be explored, we could look at what happens if the strategic informed trader is uncer tain about the risk aversion or the precision of information of the c ompetitive traders: what if there is more than one strategic informed trader, or what if the strategic informed trader is risk averse? Wit h respect to the latter issue, the results of Holden and Subrahmanyam (1992, 1994) seem to indicate that in such a case, information shoul d be incorporated into prices much more quickly. Another relevant ext ension would inquire about the incentives to form coalitions of compe titive informed traders. The benefit of forming a coalition is to sha re and improve information about the liquidation value of the risky a sset. The cost is the internalization of information leakages and the subsequent incentive to refrain from trading aggressively. Still ano ther extension would consider introducing the costs of submitting ord ers.

On another front, our model points toward market design to facilita te price discovery and prevent manipulation. For example, can activit y rules for traders be devised to improve the performance of the tato nnement? This alludes to the more general issue of finding a market d esign that performs well and is robust to changes in the environment. The topic is of relevance for a range of market environments in whic h agents can revise their trades before the market opens, including e lectricity auctions and parimutuel betting as well as the preopening period in stock markets.

(1) See Withcomb (1985) and Amihud and Mendelson (1987). In the NYS E the specialist provides some information to floor traders, but ther e is no organized information tatonnement to set the opening price. I n some circumstances the revision of orders is allowed at the opening (see Stoll and Whaley, 1990). For evidence of price discovery in the preopening at the NYSE and Nasdaq see, respectively, Madhavan and Pa nchapagesan (2000) and Cao, Ghysels, and Hatheway (1998).

(2) Otherwise the best limit/ask limit is displayed. Sec Xetra Mark et Model Release 3 at www.exchange.de.

(3) See Xetra Market Model Release 3 at www.exchange.de.

(4) See their article for details of the tatonnement in the Paris B ourse, and see Biais, Hillion, and Spatt (1995) for a general analysi s of trading in the Paris Bourse.

(5) A similar result is obtained by Sola (1999) with data from the Bolsa de Madrid.

(6) The fact that large agents tend to minimize the price impact of their trades has already been established in the empirical literatur e (see, for example, Chart and Lakosnishok, 1995 and Keim and Madhava n, 1995, 1996).

(7) Other incentives to submit orders may be related to sunshine tr ading (see Admati and Pfleiderer, 1991) or cooperative mechanisms by market makers to produce "price discovery" (Cao, Ghysels, and Hathewa y (1998) find leadership patterns among market makers in the preopeni ng at Nasdaq).

(8) As the author notes, however, the manipulation test is a test o f a joint hypothesis of ignorance of the existence of a manipulator, noticeability of the bets, asymmetry of reaction to the placement and cancellation of the manipulating bets, and some specific behavioral assumptions about the population of bettors.

(9) The assumption is similar in spirit to the exogenous random del ays in communicating offers in the model of bargaining with deadlines of Ma and Manove (1993). In this context, players begin to send offe rs when there is a positive probability that an offer may arrive afte r the deadline has expired.

(10) All these auctions have three phases: call, in which orders ca n be entered or preexisting orders modified or cancelled; price deter mination; and order book balancing. Volatility interruptions may occu r during

auctions or continuous trading when prices lie outside certa in predetermined price ranges. A volatility interruption is followed by an extended call phase, which also terminates randomly.

(11) With normal distributions it is an open question whether nonli near equilibria exist in Kyle (1985) as well as in our model. In the Kyle model, however, when the insider submits a demand schedule, ther e is a unique equilibrium (linear under the normality assumption) bot h in static (Rochet and Vila, 1994) and dynamic (Back, 1992) settings .

(12) For example, Allen and Gonon (1992) explain price manipulation by an uninformed agent in the presence of asymmetries in noise tradi ng (noise selling is more likely than noise buying) or in whether buy ers or sellers are informed (with short-sale constraints, exploiting good news is easier than exploiting bad news).

(13) Important ingredients of their model are that agents want to t rade only one unit, the fundamental value follows a two-state distrib ution, and market makers fix prices before seeing the order flow.

(14) This is a finite-horizon version of the tatonnement process in Vives (1995) with the addition of a large informed trader.

(15) The model as stated also encompasses the case in which only th e orders of noise traders are cancelled if the market does not open.

(16) In Gould and Verrecchia (1985), for example, the price quoted by the specialist is garbled.

(17) Efficient pricing would be the outcome of Bertrand competition among risk-neutral market makers who observe the order flow.

(18) It must be pointed out that our model does not match exactly t he communication breakdown story, since in the latter a trader has a certain individual probability of being cut off from the market, wher eas in our model the market opens or not for everybody.

(19) The precision of a random variable x, [MATHEMATICAL EXPRESSION NOT REPRODUCIBLE IN ASCII], will be denoted in general by [[Tau].sub .x].

(20) To find the equilibrium, we have to solve a difference equatio n system with N periods and 2 unknowns in each period. This is compli cated because the system cannot be iterated backward as in Kyle (1985) or Holden and Subrahmanyam (1992) or forward as in Vives (1995).

(21) The proof of existence and uniqueness with demand schedules fo llows the same logic as in Kyle (1985). That is, we can find a way to iterate the dynamic equation system backward. The reason is that the responsiveness to signals of the competitive informed traders is con stant through time.

(22) An increase in [[Alpha].sub.n] has two contradictory effects o n market depth. The first is positive by making the order flow more i nformative about v, which tends to reduce the informational disadvant age of the market makers. The second is negative because the order fl ow is more likely to reflect the demand of the strategic informed tra der, which tends to make more severe the adverse selection problem fa ced by the market makers. The second (first) effect dominates when [[Alpha].sub.n] and n are small (large).

(23) While it is clear that the volatility of prices is higher in t he competitive equilibrium for n small, this volatility may become la rger in the monopolist equilibrium for n close to N and N not too lar ge. (This is more likely to happen if the noise in the private signal s of the agents in the competitive economy is high.)

(24) The result depends on the form of the sequence of probabilitie s {[[Gamma].sub.n]}. For example, if the sequence is constant ([[Gamm a].sub.n] = [Gamma] for all n except [[Gamma].sub.N] = 1) and N is la rge, the expected volume traded by the monopolist informed trader may decrease for n small and then increase as n gets close to N.

(25) Obviously, if [[Gamma].sub.n] = 0 for n [is less than] N, in e quilibrium, the competitive agents may put any weight on their inform ation.

(26) The result can be checked with the first-order condition of th e strategic informed trader's maximization problem at t = n [is less than] N: [1 - (1 - [Mu])[[Lambda].sub.n][a.sub.n]] [[Gamma].sub.n] - 2(1 - [[Gamma].sub.n])[Mu][[Lambda].sub.n][H.sub.n]] = 2[Mu][[Lambda] .sub.n][[[Gamma].sub.n] - (1 - [[Gamma].sub.n])[Mu][[Lambda].sub.n][H .sub.n]][[Alpha].sub.n]. If [[Gamma].sub.n] = 0, the equation is sati sfied if [[Lambda].sub.n] = 0 or if [1 - (1 - [Mu])[[Lambda].sub.n][a .sub.n]] = [Mu][[Lambda].sub.n][[Alpha].sub.n]. It call be shown that the latter equation has no real solution. Therefore, [A.sub.n] = 0.

(27) For the case N = 2 at the unique linear equilibrium for [[Gamm a].sub.1] close to zero, [[Alpha].sub.1] [is less than] 0 and [[Alpha].sub.1] is increasing in [[Gamma].sub.1].

(28) We do so given the difficulty in establishing analytically gen eral

properties of the equilibrium. Our iterative procedure to comput e the equilibrium is available upon request.

(29) If [Gamma] is low, market manipulation is extreme during the f irst stages, the order flow is almost equal to noise traders' demand, and market depth is very high. As n increases, market manipulation d ecreases, the likelihood that the order flow reflects informed tradin g increases, and market depth decreases. However, for intermediate va lues of [Gamma] and n close to N, sufficient information may have bee n revealed for market depth to increase with n. If [Gamma] is high, t here is no manipulation, the order flow strongly reflects informed tr ading, and market depth is low at n = 1. Information revelation is re latively fast (and decelerates with n). As n grows, the information e ffect dominates and, as in the competitive model, market depth increa ses.

(30) If there is market manipulation, most of the trading coming fr om competitive informed agents is absorbed by the strategic informed trader. As n increases, the incentives to manipulate the market decre ase, and market makers absorb a higher share of trading coming from t he competitive informed sector. At some stage, [[Alpha].sub.n] [is gr eater than] 0 and market makers become the counterpart for all inform ed and noise trading.

(31) We have simulated the model in the following range of parameter values: [Alpha] in {1, 2, 4}, {[Tau].sub.u], [[Tau].sub.v] and [[Ta u].sub.[Epsilon]] in {.5, 1, 2}, [Gamma] in {.3. .5, .7}, and [Mu] in {0, .2, .5, .8, 1} with N up to 30 rounds.

(32) The effect of an increase in [Mu] on [a.sub.t] is not uniform (if [Mu]' [is greater than] [Mu] there is a critical n such that [a'. sub.t] [is less than] [a.sub.t] for t [is greater than] n and [a'.sub .t] [is greater than] [a.sub.t] for t [is less than or equal to] n). An increase in [Mu] decreases [t.sub.n]. If [Mu]' [is greater than] [Mu], then there is a critical n such that [([[Lambda]'.sub.t]).sup.-1] [is less than] [([[Lambda].sub.t]).sup.-1] for t [is greater than] n and [([[Lambda]'.sub.t]).sup.-1] [is greater than] [([[Lambda].sub. t]).sup.-1] for t [is less than or equal to] n. Market depth increase s with [Mu] at the first stages of the process and decreases with [Mu] when n gets close to N.

(33) The conditional expected profit [Mu][[Alpha].sub.n]/[[Tau].sub .n] may be nonmonotone in [Mu] for intermediate values of n when [Alp ha] is close to zero.

(34) Simulations have been performed in the following range: [Rho] in {1,

2, 4}, [[Tau].sub.u], [[Tau].sub.v], and [[Tau].sub.[Epsilon]] in {.5, 1, 5}, [Mu] between .01 and 1 with a step of .05, and [Gamma] with the same step from .01 until .5. The upper bound for [Tau] is attained in 30 rounds or less. For [Gamma]'s up to .7 and [Mu]'s no s maller than .2, the upper bound for [Tau] is attained in 40 rounds or less.

(35) It should be clear that in equilibrium [H.sub.n] [is greater t han or equal to] 0. A negative [H.sub.n] means a negative strategic i nformed trader's expected profit, but the strategic informed trader a lways has the option not to trade at any time, obtaining a zero (nonr andom) profit.

(36) Drop the subscript on p. We know that cov(v, p) = var p, since cov(v - E(v | p), E(v | p)) = 0, and p = E(v | p). Therefore, var(v - p) = var v + var p - 2cov(v, p) = var v - var p. Furthermore, var v = var(v | p) + var E(v | p) = var(v | p) + var p and therefore var(v - p) = var(v | p).

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Appendix

In this Appendix we provide proofs of Proposition 1, Lemma 1, and Lemma A1 (with statement), and we develop the analysis of the equili brium in demand schedules (Proposition A1).
Proof of Proposition 1. At a linear equilibrium, and given our assu mptions, all random variables are normally distributed. Maximization of a CARA utility function by competitive agent i then yields at stag

e n

[X.sub.in]([s.sub.i], [p.sup.n-1]) = E {(v - [p.sub.n]) | [s.sub.i]
, [p.sup.n-1]} / [[Rho]var {v - [p.sub.n]) | [s.sub.i], [p.sup.n-1]}]
,

where [p.sub.n] = E(v | [[Omega].sup.n]) from the competition among market makers, and where [[Omega].sub.n] is the n-period order flow, which is given by [[Omega].sub.n] = [Mu][y.sub.n] + [x.sub.n] + [u.sub.n] with [MATHEMATICAL EXPRESSION NOT REPRODUCIBLE IN ASCII]. Equilibria will be symmetric in the treatment of the competitive informed agents. Let the candidate equilibrium strategy [X.sub.in]([s.sub.i], [p.sup.n-1]) = [a.sub.n][s.sub.i] + [[Phi].sub.n]([p.sup.n-1]), where [[Alpha].sub.n] [is greater than] 0, and [[Phi].sub.n](.) is a linear function. Let the strategic informed trader's candidate equilibrium strategy be [Y.sub.n](v, [p.sub.n-1]) = [a.sub.n]v+[[Phi].sub.n]([p.sup.n-1]), where [[Phi].sub.n](.) is also a linear function. The corresponding order flow will be given by [[Omega].sub.n] = [[Mu][[Alpha].sub.n] + (1 - [Mu])[a.sub.n]]v + [Mu][[Phi].sub.n]([p.sub.n-1]) + (1 - [Mu])[[Phi].sub.n]([sup.n-1]) + [u.sub.n], since [MATHEMATICAL EXPRESSION NOT REPRODUCIBLE IN ASCII], using our convention about the average signal of the competitive agents. Note that the informational content of the order flow is summarized in the variable [z.sub.n] = [A.sub.n]v + [u.sub.n], where [A.sub.n] = [Mu][[Alpha].sub.n] + (1 - [Mu][a.sub.n]. Similarly to Vives (1995), we obtain that the optimal strategy of the competitive informed i agent is given by [X.sub.in]([s.sub.i], [p.sup.n-1]) = [a.sub.n] (v - [p.sub.n-1]) with [a.sub.n] = [[Rho](1/[[Tau].sub.[Epsilon]] + var{[p.sub.n] | [p.sub.n-1]})].sup. [[1] = [([[Rho][([[Tau].sub.[Epsilon]]).sup.-1] + [([[Tau].sub.n-1]).sup.-1] - [([[Tau].sub.n]).sup.-1]]}.sup.-1].

Consider now the problem of the strategic informed trader. At stage n the strategic informed trader will face the following expected profit conditional on his information:

E{[[Pi].sub.n] | v, [p.sup.n-1]} = [[Gamma].sub.n]E {(v - [p.sub.n] - [Mu][y.sub.n] | v, [p.sup.n-1]} + (1 - [[Gamma].sub.n])E{[[Pi].sub.n+1] | v, [p.sup.n-1]},

where E{[[Pi].sub.n+1] | v, [p.sup.n-1]} is the expected continuation profit. Suppose that

E{[[Pi].sub.n+1] | v, [p.sup.n]} = [Mu] ([H.sub.n][(v - [p.sub.n]).sup.2] + [[Delta].sub.n]),

where [H.sub.n] and [[Delta].sub.n] are constants. Then the strategic informed trader's objective function at stage n is given by

[MATHEMATICAL EXPRESSION NOT REPRODUCIBLE IN ASCII]

It can be checked that

E{[p.sub.n] | v, [p.sup.n-1]} = [p.sub.n-1] + [[Lambda].sub.n](1 - [Mu])[a.sub.n](v - [p.sub.n-1]) + [Mu][[Lambda].sub.n][y.sub.n]

and

[MATHEMATICAL EXPRESSION NOT REPRODUCIBLE IN ASCII]
since [u.sub.n] is independent of {v, [p.sup.n-1]}. By substituting these expressions into the objective function E{[[Pi].sub.n] | v, [p .sup.n-1]}, we have
[MATHEMATICAL EXPRESSION NOT REPRODUCIBLE IN ASCII]
The first-order condition directly yields [y.sub.n] = [[Alpha].sub. n](v -[p.sub.n-1]), with
[MATHEMATICAL EXPRESSION NOT REPRODUCIBLE IN ASCII]
The second-order condition is given by [[Lambda].sub.n][Mu][[Gamma] .sub.n] - (1 - [[Gamma].sub.n])[Mu][[Gamma].sub.n]] [is greater than] 0. By substituting (back) [y.sub.n] = [[Alpha].sub.n](v - [p.sub.n-1]) into the objective function, we directly obtain the equations
[MATHEMATICAL EXPRESSION NOT REPRODUCIBLE IN ASCII]
Finally, the boundary conditions [H.sub.N] = 0, [[Delta].sub.N] = 0 and 2[Mu][[Alpha].sub.N][[Lambda].sub.N] = [1 - (1 - [Mu])[[Lambda] .sub.N][a.sub.N]] may easily be found by solving the strategic inform ed trader's problem at stage N. The objective function is given by [y .sub.N] [{1 - [[Lambda].sub.N](1 - [Mu])[a.sub.N]}(v - [p.sub.N-1]) - [Mu][[Lambda].sub.N][y.sub.N]], so that [H.sub.N] = 0 = [[Delta].sub N]. Moreover, it is obvious that no new profit may be made after tra e is consummated at t = N, which implies that [H.sub.N] and [[Delta] .sub.N] must be equal to zero. The optimal strategy is [x.sub.N] = [[Alpha].sub.N](v - [p.sub.N-1]), with [[Alpha].sub.N] = [1 - (1 - [Mu] [[Lambda].sub.N][a.sub.N]]/(2[Mu][[Lambda].sub.N]).
Now we will check the inequalities in Corollary 1. From the first- and second-order conditions we know that there is a (linear) equilibr um if and only if there are [[Alpha].sub.n] and [a.sub.n] for n = 1, ..., N that satisfy the equation system (for n = 1,..., N)
[MATHEMATICAL EXPRESSION NOT REPRODUCIBLE IN ASCII]
and the second-order conditions [[Lambda].sub.n][Mu][[[Gamma].sub.n] - 2(1 - [[Gamma].sub.n])[Mu][[Lambda].sub.n][H.sub.n]] [is greater than] 0, where [H.sub.n] = (1 - [[Lambda].sub.n+1][A.sub.n+1])[[[Gamm a].sub.n+1][[Alpha].sub.n+1] + (1 - [[Gamma].sub.n+1]) [H.sub.n+1](1 - [[Lambda].sub.n+1][A.sub.n+1])], [[Lambda].sub.n] - [[Tau].sub.u][A .sub.n]/[[Tau].sub.n], [A.sub.n] = [Mu][[Alpha].sub.n] + (1 - [Mu])[a .sub.n], [H.sub.N] = 0, [[Delta].sub.N] = 0, [[Tau].sub.0] = [[Tau].s ub.v], and [[Tau].sub.n] = [[Tau].sub.n-1] + [[Tau].sub.u][([A.sub.n]).sup.2], for n = 1, ..., N. This system of equations in {[a.sub.1], ..., [a.sub.N], [[Alpha].sub.1],..., [[Alpha].sub.N]} can be transfor med into an equivalent system in the unknowns {[a.sub.1], ..., [a.sub .N], [[Lambda].sub.1], ..., [[Lambda].sub.N]}:
[MATHEMATICAL EXPRESSION NOT REPRODUCIBLE IN ASCII]
From a simple inspection of the second-order conditions with [Mu] [is greater than] 0, [[Lambda].sub.n][Mu][[[Gamma].sub.n] - (1 - [[Gam

ma].sub.n])[Mu][[Lambda].sub.n][H.sub.n]] [is greater than] 0, it is easy to see that in equilibrium [[Lambda].sub.n] [is greater than] 0, since [Mu], [[Gamma].sub.n], (1 - [[Gamma].sub.n]), and [H.sub.n] are all nonnegative.(35) Consider the equation in [a.sub.], [a.sub.n] = [{[Rho] [[([[Tau].sub.[Epsilon]]).sup-1] + [([[Tau].sub.n-1]).sup.-1] - [([[Tau].sub.n]).sup.-1]]}.sup.-1]. As in Vives (1995), given [[Alpha].sub.n] or [[Lambda].sub.n], it is easily checked that this is a cubic equation with a unique positive root. Now, given nonnegative [H.sub.n], [[Tau].sub.n], and [a.sub.n], (**) is a cubic polynomial equation in [[Lambda].sub.n] of the form F([[Lambda].sub.n]) = 0. It can be checked that, given nonnegative [H.sub.n], [[Tau].sub.n], and [a.sub.n], this equation has a negative solution (since F(0) [is less than] 0 and, if [[Lambda].sub.n] tends to -[infinity], F([[Lambda].sub.n]) tends to +[infinity]), a solution in the open interval (0, [[Gamma].sub.n]/[(1 - [[Gamma].sub.n])[Mu][H.sub.n]]), and a third solution strictly greater than [[Gamma].sub.n]/[(1 - [[Gamma].sub.n])[Mu][H.sub.n]], since F(0) [is less than] 0, F([[Lambda].sub.n]) [is greater than] 0 if [[Lambda].sub.n] = [[Gamma].sub.n]/[(1 - [[Gamma].sub.n])[Mu][H.sub.n]], and F([[Lambda].sub.n]) tends to -[infinity] if [[Lambda].sub.n] tends to +[infinity]. While neither the smallest nor the largest root satisfies the second-order condition [[Lambda].sub.n][Mu][[[Gamma].sub.n] - (1 - [[Gamma].sub.n])[Mu][[Lambda].sub.n][H.sub.n]] [is greater than] 0, the middle root does satisfy it. In consequence, 0 [is less than] [Mu][[Lambda].sub.n][H.sub.n] [is less than] [[Gamma].sub.n]/(1 - [[Gamma].s the inequalities follow easily. Q.E.D.

Proof of Lemma 1. The results are immediate from the fact that if z is normally distributed with E z = 0, then E|z| = [(2/[Pi]).sup.1/2] [[var z].sup.1/2] and from the equilibrium expressions in Proposition 2. We know that [x.sub.ni] = [a.sub.n]([s.sub.i] - [p.sub.n-1]) and therefore E [x.sub.in] = 0 (E [s.sub.i] = E v = E [p.sub.n]). Furthermore, var [x.sub.in] = [([a.sub.n]).sup.2]var([s.sub.i] - [p.sub.n-1]) and var([s.sub.i] - [p.sub.n-1]) = 1/[[Tau].sub.[Epsilon]] + var(v - [p.sub.n-1]) = 1/[[Tau].sub.[Epsilon]] + 1/[[Tau].sub.n-1] because var(v - [p.sub.n-1]) = var(v | [p.sub.n-1]) = 1/[[Tau].sub.n-1].(36) We have then that E |[x.sub.in]| = [(2/[Pi]).sup.1/2][a.sub.n][(1/[[Tau].sub.[Epsilon]] + 1/[[Tau].sub.n-1]).sup.1/2,] given that [a.sub.n] [is greater than or equal to] 0, and, similarly, E |[y.sub.n]| = [(2/[Pi]).sup.1/2][([([[Alpha].sub.n]).sup.2]/[[Tau].sub.n-1]).sup.1/2]. Finally, [MATHEMATICAL EXPRESSION NOT REPRODUCIBLE IN ASCII], where [x.sub.n] = [integral of] [x.sub.ni] di = (1 - [Mu])[a.sub.n] (v - [p.sub.n-1]). Since [u.sub.n] is independent of (v - [p.sub.n-1]) and E [[Omega].sub.n] = 0, we have that E |[[Omega].sub.n]| = [(2/[Pi]).sup.1/2][[var [[Omega].sub.n]].sup.1/2] = [(2/[Pi]).sup.1/2][var [u.sub.n]+[([A.sub.n]).sup.2]var[(v - [p.sub.n-1])].sub.1/2] = [[(2/[Pi])

.sup.1/2][([[Sigma].sub.u]).sup.2]+([A.sub.n]).sup.2] /[[Tau].sub.n-1]].sup.1/2]. The expression for E T [V.sub.n] follows. Q.E.D.

Lemma A1. Let [q.sub.n] = [[Lambda].sub.n] [H.sub.n]. The solution of the difference equation system (1, 2, 3) in Proposition 3 is given by starting from [q.sub.N] = 0 and iterating backward for [q.sub.N-1], ..., [q.sub.1] using the unique root of the cubic equation 8[(1 - [[Gamma].sub.n-1]([q.sub.n-1]).sup.3] - 8 [[Gamma].sub.n-1][([q.sub.n -1]).sup.2] - 2[(1 - [[Gamma].sub.n-1]).sup.[k.sub.n][q.sub.n-1] + [[Gamma].sub.n-1][k.sub.n] = 0, where [k.sub.n] = [([[Gamma].sub.n]).su p.3]/[[Gamma].sub.n - 2[q.sub.n](1 - [[Gamma].sub.n])]. At stage n, t he solution [q.sub.n] lies in the interval (0, [k.sub.n]/2). Then ite ate forward for each of the following variables in the order listed: [[Tau].sub.n] = 2[1 - [q.sub.n](1 - [[Gamma].sub.n])/[[Gamma].sub.n]][[Tau].sub.n-1] [[Alpha].sub.n] = [{[[Tau].sub.n]/(2[[Tau].sub.u])[[[Gamma].sub.n] - 2[q.sub.n](1 - [[Gamma].sub.n])]/[[[Gamma].sub.n] - [q.sub.n](1 - [[Gamma].sub.n])]}.sup.1/2] [[Lambda].sub.n] : [[Tau]. ub.u][[Alpha].sub.n]/[[Tau].sub.n], starting from [[Tau].sub.0] = [[Tau].sub.v]. Finally [H.sub.n] and Delta].sub.n] are calculated using the equations (2) and (3) above.

Corollary A1. We have that [MATHEMATICAL EXPRESSION NOT REPRODUCIBL N ASCII].

Proof. Available upon request. Similar to the methods developed in lden and Subrahmanyam (1992) and also in Foster and Viswanathan (19).

Equilibrium with demand schedules. Consider a version of the gen al model in which both the strategic and the competitive informed a ents submit demand schedules instead of market orders. At stage n, i nformed agent i submits a demand schedule [X.sub.ni] ([p.sub.n]; [s.s b.i], [p.sup.n-1]), contingent on the private signal [s.sub.i] he ha and the past history of prices. Similarly, the strategic informed t ader's strategy at n is a demand function contingent in his private nformation (v) and past prices, [Y.sub.n] ([p.sub.n]; v [p.sub.n-1]).

As before, noise traders are assumed to submit at round n the order [u.sub.n], and market makers quote prices efficiently on the basis o public information and the aggregate limit order book, which is jus a noisy version of the aggregate orders of informed agents, [L.sub. n]([p.sub.n]) = [Mu][y.sub.n]([p.sub.n]) + [x.sub.n] ([p.sub.n]) + [u .sub.n], where [MATHEMATICAL EXPRESSION NOT REPRODUCIBLE IN ASCII].

Proposition A1. There exists a unique linear equilibrium characteri zed by (for n = 1, ..., N):

[X.sub.n]([p.sub.n]; [s.sub.i], [p sub.n-1]) = a([s.sub.i] - [p.sub .n]), [Y.sub.n]([p.sub.n]; v, [p.sub.n-1]) = [[Alpha].sub.n](v - [p.s ub.n]), [p.sub.n] = [[Lambda].sub.n][[Omega].sub.n] + [p.sub.n-1], where a = [[Tau].sub.[Epsilon]]/[Rho], [[Omega].sub.n] = [A.sub.n]

(v - [p.sub.n-1]) + [u.sub.n], [[Lambda].sub.n] = [[Tau].sub.u][A.sub
.n]/[[Tau].sub.n], [A.sub.n] = [Mu][[Alpha].sub.n] + (1 - [Mu])a, [MA
THEMATICAL EXPRESSION NOT REPRODUCIBLE IN ASCII]. At stage n, the str
ategic informed trader's expected continuation profit is given by E{[
[Pi].sub.n+1] | v, [p.sup.n]} = [Mu][H.sub.n][(v - [p.sub.n]).sup.2]
+ [Mu][[Delta].sub.n]. The constants [[Alpha].sub.n], [H.sub.n], and
[[Delta].sub.n] are given by the solutions to the difference equation
system
[MATHEMATICAL EXPRESSION NOT REPRODUCIBLE IN ASCII]
subject to the boundary conditions [H.sub.N] = 0, [[Delta].sub.N] =
0, 2[Mu][[Alpha].sub.N][[Lambda].sub.N] = 1, and the second-order co
nditions [[Lambda].sub.n] [is greater than] 0 for all n = 1, 2, ...,
N.

Proof. Available on request.

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Partial support from DGICYT projects 93-0679 and PB98-0696 is grate
fully acknowledged. We are grateful to Peter Bossaerts, Joe Harringto
n, Craig Holden, three anonymous referees, and seminar participants a
t numerous institutions for helpful comments.

EVENT NAMES: CONTRACTS AND ORDERS; CORPORATE FINANCIAL DATA;
COMMODITY MARKETS; RESEARCH AND DEVELOPMENT; STOCKS AND SH/
AND PLANNING; THEORETICAL ANALYSIS
INDUSTRY NAMES: BETTING AND GAMBLING; CORPORATE; FINANCIAL SER'
INVESTMENT; LEISURE; STOCKS AND SHARES; THEORETICAL ANALYSIS
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